AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 6, No. 19 WEEKLY. | NEW YORK, MAY 12, 1883. | $3.00 per Annum. SINGLE COPIES, 6 CENTS.

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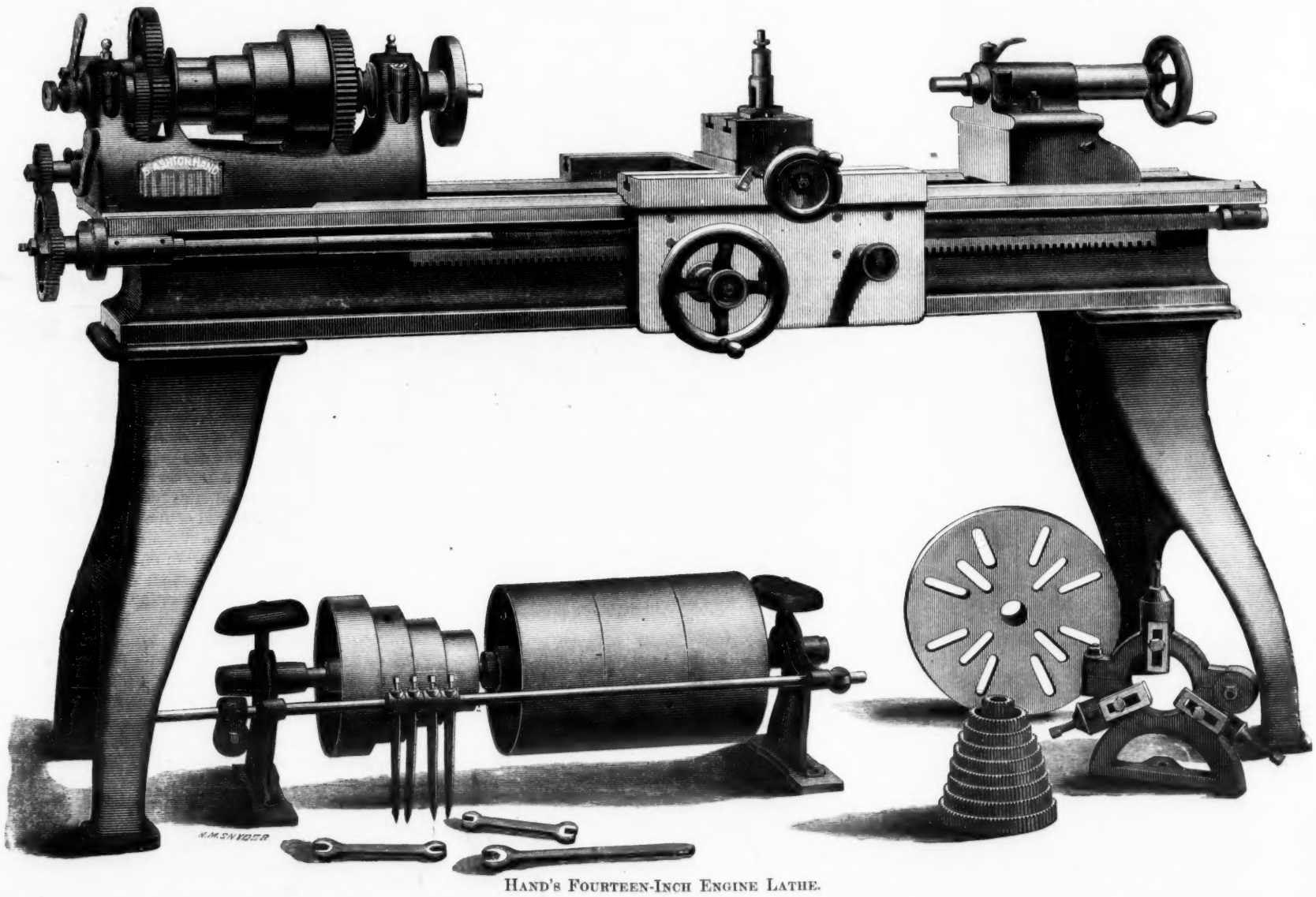
Hand's Fourteen-Inch Engine Lathe.

We present with this an engraving of an engine-lathe built by S. Ashton Hand, Toughkenamon, Pa. This tool represents no especially novel features of construction, the claim of the manufacturer being to furnish a tool made in the most thorough manner and of the best material, of ample strength, and arranged for convenience and ease of handling. The lathe will swing 14″ over the bed, 9½″ over the carriage, and with 6-foot bed will turn 40″ between centers.



HAND'S FOURTEEN-INCH ENGINE LATHE.

The spindles—live and dead—are of hammered cast steel. The front-bearing of live spindle is 2″ diameter and 4″ in length; the back-bearing 1½″ diameter and 2 5/16″ long. There is a hole 1⅛″ diameter through the live spindle. The spindle bearings are of copper and tin bronze. The cone has four changes, for a wide belt, and is balanced by being turned inside, which insures steadiness in running at high speed.

The carriage, as will be seen, has broad-bearing surface on the bed, to which it is gibbed. These surfaces, as well as all others, are fitted by scraping. The top of the carriage presents a flat surface to which pieces for boring may be conveniently and readily bolted. The tool block has a bronze taper wedge for taking up wear, and is of a construction in which the tool can be raised or lowered without loosening it.

The feed gears, shafts and studs, as well as all actuating screws, are made of steel, and all wrought-iron work that is liable to be bruised in use is protected by being case-hardened. Rack and gears are cut from solid metal.

Particular pains are taken by the manufacturer to provide an accurately-cut leading screw, which is used only for screw-cutting. With the ordinary change gears furnished, all threads from 2 to 16, inclusive, may be cut, and all even threads up to and including 32.

The engraving shows the equipments considered as belonging to the lathe. The weight of the lathe, with six-foot bed, is 1,500 lbs. It is made with any length of bed desired.

One loss from using poor coal under a boiler, that is not always considered at its full value, is the necessity for more frequently opening doors for cleaning fires. A loss always occurs from this, but at the same time the fires must be kept clean. For this reason, the proportionate calorific effect of poor coal is seldom realized in the generation of steam. With a boiler small for the work this loss is greater than in one that is ample for the purpose.

Extracts from Chordal's Letters.

SETTLING THE EXPENSE OF FINDING WHY A MACHINE WON'T WORK PROPERLY—HOW OUR GOVERNMENT CARRIES OUT ORIGINAL TESTS—BEST MATERIAL FOR STAY BOLTS AND BEST FORM OF HEAD—CHARM OF DOING ROUGH JOBS AS A VOLUNTEER—THREADING GAS PIPE IN A LATHE.

Mr. Editor:

* * * Two or three weeks ago I told you of Simpson's case of a customer rendering a bill for the expense of finding out whether or not the machine he bought of Simpson was a good one. The case has been settled, and without any fussing or arbitration. The customer's good logic and Simpson's pride accomplished the purpose.

Simpson stated to the customer: "We cheerfully rectify all faults at our own expense as soon as we discover them, in doing which we fulfil our duty, and the expense of the test was yours."

The customer said: "In buying of you, I bought of a responsible and reputable builder. You must admit the dignity of this position, and you must stand behind this bargain. If you neglect the principle involved in this question, every Tom, Dick and Harry can go into the market with this machine, and probably be as quick in getting customers as you can."

* * * If a first-class steam-engine builder should desire exhaustive information upon the subject of pillow blocks, for instance, and should ask this information of one sufficiently skilled to procure it by practical tests, I suppose that $150, would be considered a fair limit for the appropriation of money for the purpose. Practical tests, using up lots of material and valuable time of skilled men, cost lots of money, and but few concerns can afford to entertain the idea of original researches. Extended original tests must be procured by the Government, and the Government which does the most in this way to aid manufactures loses the least money in the end. So far as I am aware, our own Government does precious little of this business. Experiments in the public interests, when once undertaken, seem invariably to give out in the middle of the work, generally from a lack of money. Congress looks at the result of the last appropriation and sees only the money business, and so lets the matter drop. But when Uncle Sam wants to know something himself, for his own individual benefit, ten chances to one he will finish the job of finding out, and do it right.

* * * The average bull-headed boiler-maker will swear by all that is holy that he

knows all about stay-bolts, and that there is nothing more to find out. As a matter of fact, he don't know anything at all about them, except as to their usual diameter and distance.

The skilled and intelligent constructors of the navy determined that there was something to be learned; and accordingly, a couple of years ago, Sprague and Tower, two naval engineers, were instructed to investigate the matter, and determine what were the best materials for stay-bolts and what the best form of head. The instructions were about as long as the questions asked.

This is the way these gentlemen went at the question: They made a composition ring 18″ in diameter, 2½″ thick and 4″ deep. On one side of it they placed a heavy steel plate, and on the other side a piece of the boiler plate to be tested. Gaskets were put between, and the whole concern was bolted up with 31 steel bolts ⅞″ in diameter. The ring had a water inlet connected with a force pump. Stay bolts were put through these two plates and pressure was applied. This test drum represented fairly the conditions under which stay bolts have to do their work. Tests were made with a thin plate of different sizes of iron, of copper, and of Otis low steel. The steel plates were made on purpose at the mill in Cleveland, and the copper plates were made on purpose in the yard at Washington. Plates were used of thicknesses from ¼″ to ½″. Stay-bolts were made of iron of different strengths, of copper, and of Otis low steel, and having diameters of from ⅞″ to 1¼″; threads 12 and 14 per inch. The style of heads tested were the plain screw, projecting slightly; the ordinary flat-conical head, formed by battering down a projection equal to three threads; a head formed, of five threads' projection, by hammer blows and button-set finish; and a cupped lock-nut packed with red-lead putty and iron borings. The spacing tested was four to eight inches between centers.

Observations were taken to determine when the first leak commenced under pressure; when the first leak commenced on letting the pressure off; the bulge of the plate at successive increases of pressure; the permanent set of the plate on relieving pressures; the time of appearance of cracks or flaws in or around the bolts; the time of giving way; the character of break or yielding and the character of the damage shown in parts not used. Careful sketches were made showing the appearance at the giving-way point.

Each individual test was gone over three times, and if there was any doubt regarding any of the observations of any test, that test was discarded entirely and a new one made.

The report of these engineers, embodied in the report of the Secretary of the Navy to the President in the year 1879, contains nearly fifty of these sketches, photo-lithographed, which are of considerable interest to boiler builders.

One noticeable feature in the report is the absence of tests upon stay bolts of the small sizes so often used in private practice, upon iron of the lower grades, and also with finer or coarser threads. The tests are apparently based upon the common practice of boiler construction in our navy.

The button-set head shows an advantage in strength of from 23 to 36 per cent. over the ordinary low head. The low head can hardly be called much more than caulking. The nuts were far ahead of any thing for strength, and have many advantages where conditions of fire-surface would permit their use.

The superior strength of the low steel was decidedly marked in bolts and plates.

While the report has not been thoroughly digested by its authors, owing to a lack of time, the following formula and table will be of considerable value, as presenting the conclusions arrived at.

The table gives constructing dimensions, and in the table W equals safe working pressure, T equals thickness of plate, d equals distance from center to center of stay bolt.

For iron plates and iron bolts.. $W=24{,}000\frac{T^2}{d^2}$

For low steel plates and iron bolts ..... $W=25{,}000\frac{T^2}{d^2}$

For low steel plates and low steel bolts..... $W=28{,}000\frac{T^2}{d^2}$

For iron plates and iron bolts, with nuts..... $W=40{,}000\frac{T^2}{d^2}$

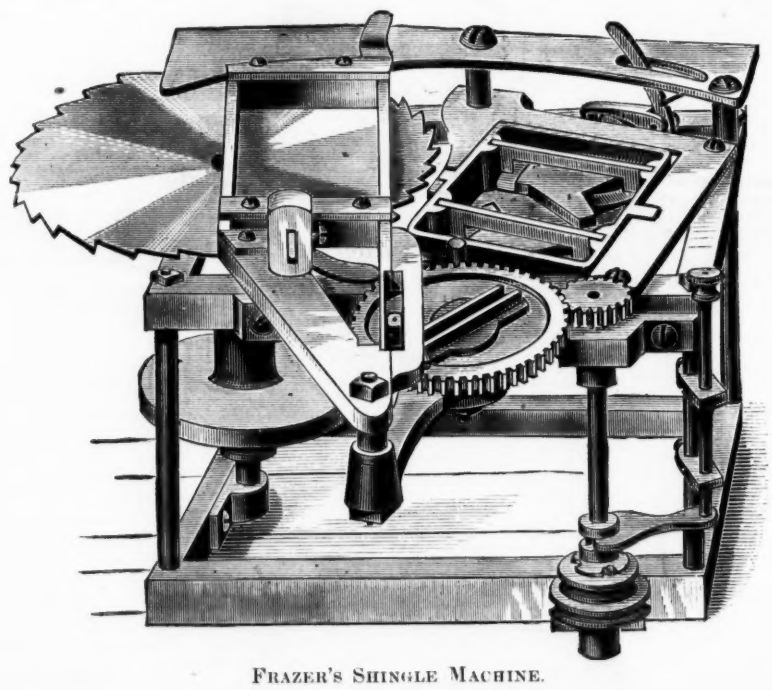
For copper plates and iron bolts ..... $W=14{,}500\frac{T^2}{d^2}$

To obtain the ultimate bursting pressure, multiply the results of the above formula by 8, which is the factor of safety used.

TABLE.

Dimensions and conditions for making iron and low steel screw stay-bolts, for flat surfaces subject to internal pressure, for distances ranging from four to eight inches, inclusive, from center to center of stay-bolt:

Thickness of plate.	Diameter of bolt outside of thread.	Number of threads per inch.	Length of bolt left through for riveting, in fractions of diameter of bolt.	Height of rivet-head when finished.	Diameter of base of rivet-head, not to exceed when finished.	Nuts.	
						Breadth of annular bearing surface.	Dished out to depth of.
¼″	1 ″	14	½	7/16″	1 5/16″	1/16″	1/16″
⅝″	1⅛″	14	½	½″	1 9/16″	⅛″	1/16″
½″	1¼″	12	½	9/16″	1¾″	5/16″	3/32″
⅝″	1⅜″	12	½	⅝″	1⅞″	¼″	3/32″



FRAZER'S SHINGLE MACHINE.

The rivet-head to be a segment of a sphere, formed by first upsetting the end of the bolt with a few quick, sharp blows of the hammer, then finished to shape with a hammer and button-head set. Where nuts *can* be used instead of riveted head, they should be of the standard size suited to the diameter of the bolt, faced on the side bearing on the plate, and dished out so as to form an annular bearing surface of as large diameter as the nut will allow, and of a breadth and depth given in the table. Before screwing the nut in place, the dished portion should be filled with red-lead putty, made stiff with *fine* iron borings.

* * * Wherein lies the charm that draws apprentices from the machine shop on the sly to the boiler shop to drive a half-dozen rivets? They all do it, if conditions are favorable. Is there a machinist living, who ever worked in a shop next door to a boiler shop, who has not left his lathe running with the feed out of gear, and devoted himself to wicked half-hours with a riveting hammer in the boiler shop? A conscience which will permit this needs a heavy qualm once in a while, and I know of one such conscience which succeeded in getting it.

A chap I know of was running a 40″ lathe on big work. He left the lathe at work, and slipped out to the boiler shop, where he devoted himself to the finer science of rivet driving. When he went back to his lathe, he found there had been something of a smash. His belt had got tangled up in some way, and the whole countershaft business pulled down, resulting in a total wreck of the entire shaft, and most of the head work of the lathe. The aforesaid chap did not stay in the town long enough after that to ascertain how much it cost to repair damages. The occurrence was made the subject of a very serious lecture by the boss, but it never was settled in my mind that the guilty fellow's absence was the cause of the accident, or that his neck would not have been broken had he been attending to his proper business.

* * * There is something of a charm in many of the rough jobs which come within the average machinist's view. Turning off a grindstone with an iron bar is one of this kind of jobs which few can resist who have tried it. When this job becomes a duty, it loses its charm and becomes irksome. A good heavy job of chipping cast iron, say something like cutting a 25-lb. sinking head off, is another one of these pleasant jobs, unless you have got to do it. I never had a job in the machine shop so attractive but what I would be glad to leave it to chip a hole in an old boiler, provided, of course, that it was somebody else's business to chip the hole, and I could do it from pure choice. If there is anything in the world I detest, it is to *have* to chip a hole in a boiler.

* * * There is one delectable job which a machinist in a good shop never gets a taste of and that is cutting threads on gas pipe in an engine lathe. And it don't make much difference whether it is small pipe or large pipe, short pieces or long pieces. It is all pipe, and it is all an unpleasant kind of lathe work. Small pipe is generally cut by grabbing one end in the chuck and running the other end on a large cone center, if you happen to have such a center. If you have not got such a center, you use a turned plug with a shoulder on it and a center in it. And if you have not got such a plug you make a bar center out of a piece of ⅝ sq. iron with shoulders chipped on each end; in fact, you use about whatever you can think of that looks as though it would do to hold up the end of the pipe. If the bar center is too long to fit the pipe, you whack some off of one end with a cold-chisel. It might not be eccentric enough if you took some off of both ends. If it is too small to fit the pipe, you mash the pipe a little. You turn the end of the pipe off by hand feeding, and if you are really lucky you may have it centered true enough to turn clean all the way round. When you cut the thread, if you have luck you will not cut clear through one side. You have to try the job in an elbow, maybe half a dozen times, and just about the time it only wants one more cut the fancy bar center tumbles out into the elbow. Then the fun begins. You put it back where it was before, but it don't fit there at all. If you put it where it does fit your pipe runs in every direction. You hammer the pipe till it looks central and try to get this last cut over the job. Maybe you will succeed in doing it, and maybe the tool will go through the pipe. It must be a very bad job indeed that you can't get off your hands in some way. If you spoil the thread entirely and cut the end of the pipe off, and cut a new thread, you can lay the error in length on some other man. If you have cut the flanges and fittings for the job yourself you know the secret of their variations, and if your pipe won't fit in one place it may fit in another. You prick-punch this work the way you intend it is to go.

Such is the average pipe job cut in a lathe. I know of lots of shops which cut inch pipe twelve threads to the inch, notwithstanding they well know that such pipe should not be twelve threads. But experience seems to have told them that a pipe thread can be jammed up to most any kind of work. I have myself been caught in the woods with gauge cocks cut sixteen threads to the inch to be screwed into a boiler tapped with a blacksmith's thread eight to the inch. I have screwed them in and made them do. In fact, they had to do. * * *

Very respectfully,

CHORDAL.

Frazer's New Shingle Machine.

The shingle sawing machine, shown in the accompanying engraving, was designed by Alexander Frazer, Detroit, Mich. It consists of a cast iron frame with a vertical saw mandrel attached to one side, as shown. The saw is secured to the upper end of this mandrel, which is driven by a belt. The frame for holding the "bolt" or block from which shingles are to be cut is pivoted to the saw frame by the stud shown at the front, near the middle of the machine. This frame has a swinging motion communicated to it by means of a gear and pinion. The large gear has a groove upon its face with a bolt fitted to it, so that the throw of the crank can be readily adjusted thereby. The pinion is attached to a vertical shaft, and receives its motion through a belt. The table with the square opening is made to tilt by means of eccentric journals attached to the frame, with the longer or heavier end resting upon triangular shaped cams rigidly secured to one end of a short shaft journaled to the frame. The end of this shaft opposite the cams has a ratchet wheel upon it. In the operation of this device an arm strikes against the end of the lever shown, projecting through a slot above the frame at the upper right corner of machine. This lever carries a dog which engages the ratchet wheel, thereby rotating the shaft with the triangular cams upon it. The reader will readily understand that the cams alternately present an edge and a flat surface as a support for the table, while in the forward movement, or as soon as the lever in the slot is released, a spring causes it to assume its original position. By this arrangement the "bolt" is presented to the saw in such a way that shingles are sawed therefrom with points and butts from alternate ends of the bolt.

By the arrangement of the crank controlling the movements of the oscillating frame it is caused to move toward the saw with a gradually decreasing speed, but in returning the speed increases until the end of the stroke is reached, making an increased ratio of three to one. The object of the inventor in making this machine has been to combine simplicity with durability, as well as to reduce the first cost. Its simplicity of design enables the operator to get at all of its parts to inspect or repair them. The inventor claims that this machine will cut three good shingles from a board one inch thick, which readily conveys an intelligent idea of the economy of this machine in the use of lumber.

The operator can work to advantage in cutting all butts and points to suit the lumber. The thickness of the shingle is regulated by a cam movement without the use of set screws, which secures correctness

of adjustment without loss of unnecessary time. This machine can be instantly changed to be used as a hand machine when so desired.

The stroke of the oscillating arm can be adjusted from zero to 16 inches. The power feed has three changes of speed. By simply raising an arm within easy reach of the operator, thereby disengaging a clutch, the machine can be stopped at once.

Foundation of Stationary Steam Engine.

The accompanying engraving shows the working drawings of the stationary engine foundation, located in the new shops of the Holyoke Machine Company, Worcester, Mass.

These shops were illustrated and described in the AMERICAN MACHINIST of March 10, 1883.

The engine is an 18x42″ Harris-Corliss, and furnishes power to drive the entire works, running at a speed of 60 revolutions per minute.

In the engraving like letters refer to like parts.

The supports for the cylinder rest upon the blocks of stone, *G*, *G*, and the crank pillow block upon *D*. The blocks, *H*, *H* and *E*, are for the purpose of furnishing a good secure support for the heads of the foundation bolts. *C* represents the wall of fly-wheel pit, and *M* the position of fly wheel. The stone *I*, is for giving additional strength to the foundation in consequence of a portion being removed from between the blocks, *G*, *G*, for the exhaust pipe. The outboard bearing foundation *F*, as will be observed, forms a part of the wall of building. *L*, shows the method of construction. *K*, the capstone, and *J*, the position of engine shaft. This foundation is built of brick upon a bottom of stone laid in cement, as shown.

It will be seen that while there is no room for loungers in the engine-room, there is plenty of space to perform all necessary work.

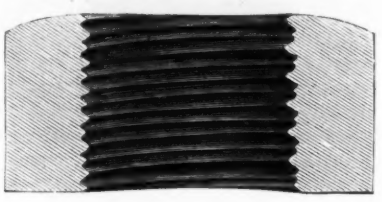


FIG. 1.

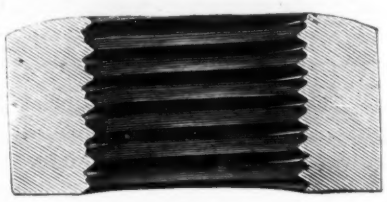


FIG. 2.

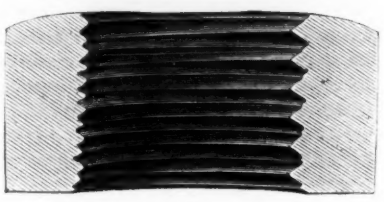


FIG. 3.

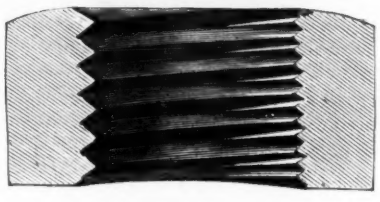
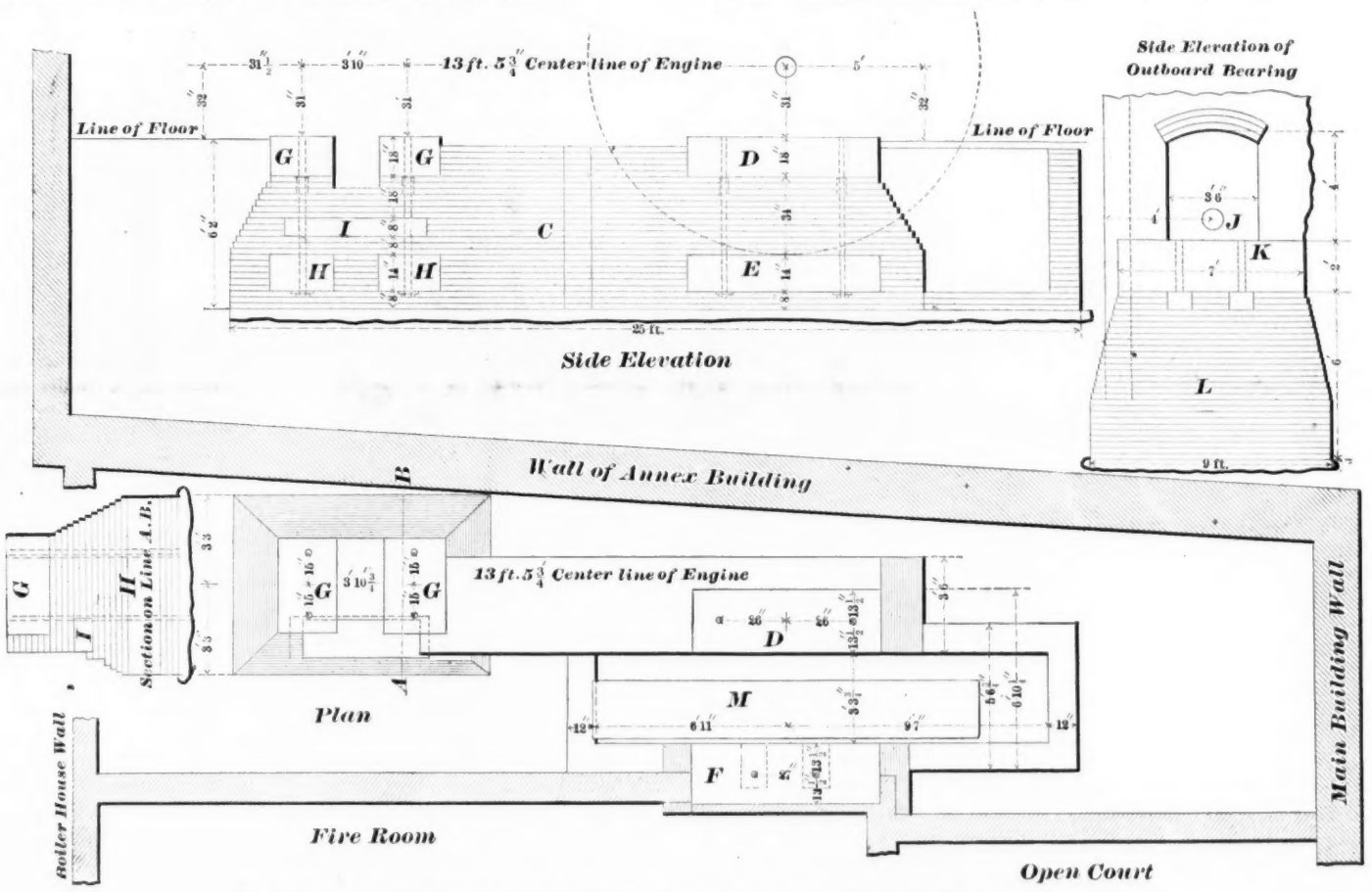


FIG. 4.



FOUNDATION OF STATIONARY ENGINE—HOLYOKE MACHINE CO.'S SHOP, WORCESTER, MASS.

Facts About Nuts.

BY LEWIS F. LYNE.

The best method for facing nuts is one that has been pretty thoroughly discussed from time to time, and of late various devices for this purpose have been illustrated and described in the columns of the AMERICAN MACHINIST.

The most intricate hair-splitting has been engaged in, and one would naturally suppose that a shop or factory furnished with all the modern appliances would produce work of an exceptionally superior quality.

One manufacturer of nuts treats his material in a certain way, and makes extravagant claims of certain important advantages in working such material, while another manufacturer is equally sanguine in reference to the claims for his system.

When case-hardened nuts were first placed upon the market, extravagant claims were made for their accuracy as to size and the trueness of their faces with the thread.

We present herewith four engravings of case-hardened nuts which were recently purchased by a leading manufacturer from one of our prominent dealers. These engravings were made from photographs taken from two ⅞-inch case-hardened nuts taken promiscuously from the lot purchased. These were not the only ones in the lot which exhibited such peculiarities. The nuts were first annealed, then sawed in two, after which the engraver produced in a very correct manner views of their interior as here shown. Figs. 1 and 2 are the halves of one nut, and Figs. 3 and 4 halves of the other. It will be observed that there is a full thread upon one side, while a double thread appears upon the opposite side. Just how this was done is a conundrum, but we here behold the evidence that it was somehow accomplished.

I do not know the name of the manufacturer who made them, but it is certain that a radical defect exists in the shops where these nuts were made. I first discovered several of these nuts upon the connecting-rod bolts of a new steam engine. These nuts, when started square upon the bolt, would run down fairly well, and when tipped to one side so that the thread would follow the upper thread upon the double side, the nut would also run down quite freely. This would seem to indicate that the tap was run through the nuts twice, because the thread upon the bolt could be made to follow either of the two threads. If any reader of the AMERICAN MACHINIST has had a similar experience with nuts, and knows the cause of the peculiarity here described, let him come forward and explain the same.

The Brooklyn Bridge is to be opened formally May 24, and for public use May 25. We are not told, however, when it will be formally completed. Another appropriation of $150,000 has been voted by the Legislature to extend the Brooklyn "approach." It is proposed to make the bridge free to foot passengers, but to take toll for vehicles. The cars that will cross the bridge are nearly all completed. They are about the same style as those of the New York Elevated Railroad, except the doors, which are larger. They are to be propelled by a wire-rope traction device, the particulars of which are as yet undecided upon. The cars will run at the rate of ten miles an hour, and will probably arrive and depart at intervals of two minutes in the busy parts of the day. Elegant iron buildings for passenger waiting rooms have been erected at both entrances to the bridge.

Conventions and Exhibitions.

The American Institute of Mining Engineers meets at Roanoke, Va., during the first week in June.

The American Society of Mechanical Engineers holds its spring meeting in Cleveland, Ohio, June 12th.

The Master Car Builders' Association meets in Chicago June 12th. Headquarters will be at the Grand Pacific Hotel.

The Railway Master Mechanics' Association holds its sixteenth annual convention in Chicago June 19th, 20th and 21st at Grand Pacific Hotel.

The American Society of Civil Engineers holds its annual convention at St. Paul and Minneapolis, Minn., beginning June 19th.

The National Exposition of Railway Appliances begins in Chicago May 24 and terminates June 23.

The Southern Industrial Exposition begins at Louisville, Ky., August 1.

The Third Annual Fair of New England Manufacturers and Mechanics' Institute begins at Boston, August 15.

The Cincinnati Exposition will open September 5th and close October 6th.

On the 21st of April died one of the most prominent steel manufacturers of this country—James Park, Jr., of Pittsburgh. In 1862 the firm of Park Bros & Co., of which he was the head, founded the Black Diamond Steel Works, now the largest crucible steel works in the world. Mr. Park also built a large copper mill near the steel works, which has been run successfully for many years. He was exemplary in all his business dealings, and left a large fortune.

The trustees of the Astor Library are considering a plan for opening one of the rooms nights for the benefit of those who cannot avail themselves of the time between ten and four o'clock.

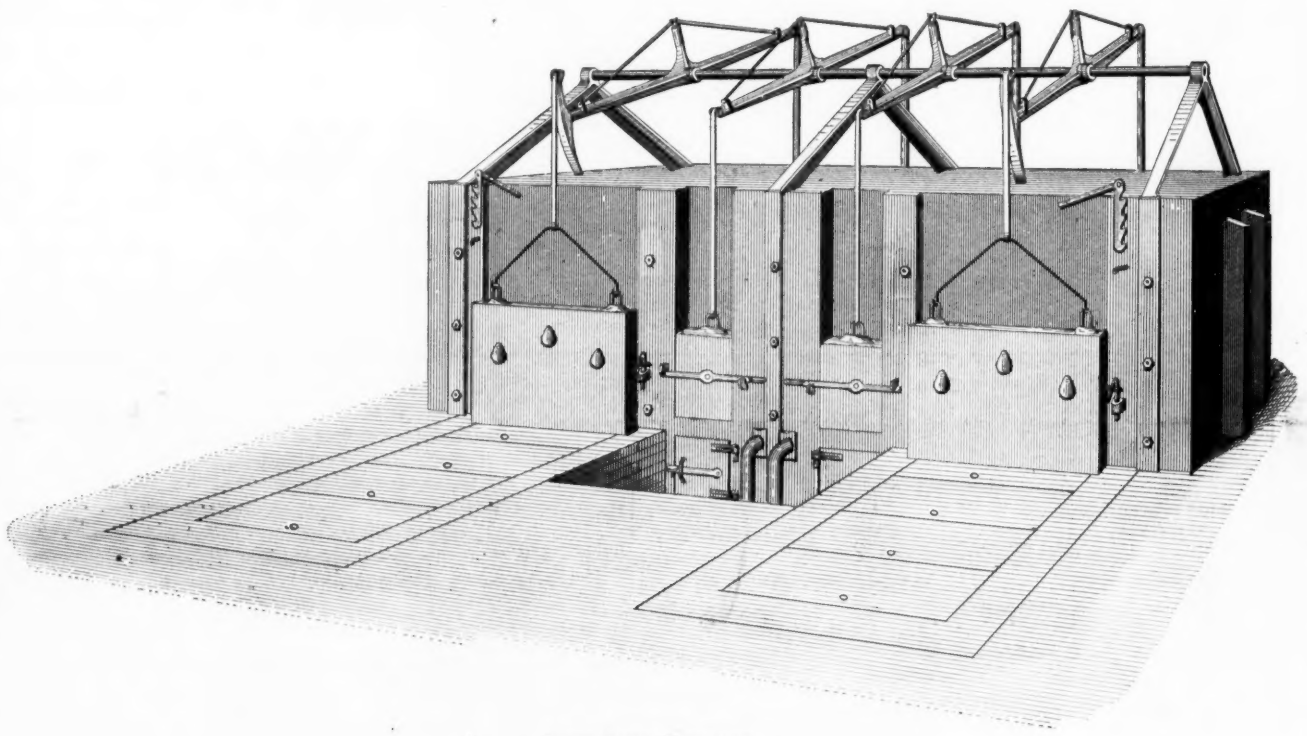
Experiments made in France seem to show that the quantity of combined carbon, in proportion to the total carbon, in compressed steel is greater than in uncompressed steel.

The Brown & Sharpe Annealing Furnace.

The engraving presented with this, represents an annealing furnace, designed for the expeditious and economical annealing of cast iron or steel where considerable quantities of either of these metals are to be subjected to this process. In construction this furnace consists of iron plates arranged to inclose the necessary space, these plates also serving as the guides between which the doors slide, and supports for the trusses in which the shaft shown in the upper part of the engraving is sustained. The separate plates are held together and in place by bolts, and also by tie rods extending through the brickwork both longitudinally and transversely.

The inside of the furnace consists of the fire space and ash pit, and the annealing oven proper, an arch extending over both. The fire space, arranged with a suitable grate, is separated from the oven by a bridge wall extending nearly to the arch, leaving only a narrow space through which the flame is forced by the blast, completely filling the oven. The outlet for the gases from the oven is through small openings from the bottom, which openings connect with the flue underneath. This construction compels the flame and hot gases to reach the flue by a circuitous course, during which time is afforded for applying the heat to the desired purpose. The flue is fitted with a damper operated from the front, by the use of which the temperature of the escaping gases may be controlled at will. In the construction of the interior, firebrick are used for the parts exposed to the flame, and both fire and oven doors are lined for protection from heat. The oven doors are provided with small holes, closed by swinging covers, and through which the interior can be seen at any time.

Upon the shaft at the top are located trussed bars, to one end of each of which is attached one of the sliding doors, which is balanced by a counterweight at the other end of the bar. This provides for the easy and rapid opening and closing of the doors in firing and charging.



ANNEALING FURNACE.

While the engraving represents the annealing furnace, made in two sizes, by a slight modification it is equally adapted for use for a case hardening furnace; when used for the latter purpose the oven is placed above the floor to facilitate the handling of the pots.

These furnaces have been in use for some years by the Brown & Sharpe Manufacturing Co., Providence, R. I, who, having demonstrated their economy in saving time and in the use of fuel, are now furnishing castings, together with drawing of brickwork, or, where desired, erecting the furnace ready for use.

M. Thiollier has been experimenting in some works erected for the purpose, near Paris, with the process for refining iron and steel by the action of damp hydrogen. The iron or steel is placed in retorts capable of being tightly sealed. The retorts are heated, and the hydrogen, freed from impurities, is forced into the retort under a pressure sufficient to cause it to penetrate the metal. Previous to the introduction of the hydrogen, and after the retort is heated, the air is driven out by the introduction of carbonic acid. Malleable cast iron under this treatment is said to acquire the properties of steel, and steel of a poor quality to be refined. The process is said to be by no means an expensive one.

Belts—The Influence of Speed—Dimensions of Pulleys.

BY CHARLES A. HAGUE.

We see by far too many pulleys disproportionately small, or running too slow for the work they are expected to do. A belt, to work to advantage, must have high velocity; and to attain this either pulleys of large diameter must be employed, or the shaft must have a high rate of revolution. Horse power is a certain number of foot pounds developed per minute; and as foot pounds are simply pounds of pressure or strain multiplied by velocity in feet traveled, it follows that the greater the speed the less will be the required strain to produce any certain horse power. This minimum of power brings benefits with it, as reduction to lowest terms of pressure on shafting, and consequent reduction of friction, both from direct pressure and from springing due to heavier pressure. A light pressure upon a journal also prevents the oil being forced out from between journal and bearings. The large pulleys necessary to high belt speed present a greater value of surface for holding the belt to its work.

There are an almost endless number of conditions resulting from the pulley question. We have repeatedly witnessed the breaking of shafts from excessive cross-strain, caused by over-tight belts, and have seen the breaking prevented, oil saved, power economized, and repairs rendered unnecessary by simply increasing the diameter of the pulleys. The shafting not only suffers, but the belting and fastenings come in for a large share of the general affliction. Where small pulleys are used, and the belt is excessively taut, it is often necessary to secure the ends of the belt by an overlapping patch, laced or riveted; whereas, by employing proper-sized pulleys, the belt may be held by the ordinary method of lacing. The principle of foot pounds is the correct one to apply to belt speed and pulley sizes, but it may be more convenient to some to look at the question in the light of leverage. With a shaft running at 200 revolutions per minute, it will certainly be easier to turn it by means of a four-foot lever (pulley radius) than by one only two feet long; but the pulley circumference, multiplied by two hundred, gives the feet of travel per minute, and this result, multiplied by the pressure required at the pulley rim to keep the shaft up to speed, will exhibit the foot pounds expended per minute to run the shaft.

This matter of reducing the action of a belt and pulley to its foundation principles, of a certain number of pounds of pressure operating at a certain rate of motion, or, in other words, the science of transmitting power by belting, is not grasped comprehensively anything like as generally as it should be. Men are quite often met with who fancy that a steam engine should have a balance wheel considerably larger than the pulley upon the crank shaft by which the engine is belted to the machinery; and that belting from the rim of the balance wheel itself is most pernicious, because in some unexplained manner the engine is choked down, or held back. As an example, I call to mind a case in which it required a pretty sharp controversy to induce the presiding genius to relinquish the idea of placing a pulley considerably smaller than the balance wheel upon the crank shaft of the engine, belting from this pulley to a countershaft, and from the countershaft to the machine to be driven; the only reason for such an arrangement being that it would give the balance wheel a certain amount of "leverage" over the belt pulley. The idea seemed to be lost sight of, or perhaps never entertained, that the power transmitted was simply so many foot pounds, obtained by multiplying the resistance of the belt by the speed at which it traveled, and that the slower the speed of the belt the greater the pressure must be to obtain the same product.

The science of transmitting power from a steam engine by means of a belt is embodied in the following: In the first place, an engine which is in good proportion to its load will develop and transmit a certain power, independently of the manner in which it is connected to its load. The manner of connection determines, mainly, how much power shall be used in friction of engine and belt, and how much net power shall go to the machinery to be driven. The diameter of a belt pulley upon the engine shaft is independent of every and all considerations, except obtaining a high belt speed, and all conditions of transmission can be so reduced that the belt speed and balance wheel requirements coincide.

If the engine is of insufficient power, or its balance wheel is not heavy enough, or its rate of revolution is too slow, or the regulating apparatus is incompetent, the delivery of energy through the belt will be unsteady, no matter how the connection is made. The whole compass of the object in view is to get the most power, in proportion to the engine, in the steadiest manner, just where it is wanted; and the method which is the most direct under the conditions conforms most closely with science and sense.

The idea of "leverage" is, no doubt, the prominent one with such as advocate the large balance wheel and small pulley plan, and to those people it may be remarked that the question of leverage does not enter into the principles of dynamic energy; and if they would recognize this fact, and lay aside completely the leverage idea, to begin with, and then absorb the idea that dynamic energy, or power, is simply two factors multiplied together, they would stand some chance of looking at this important matter in a clearer light. The two factors to be multiplied together are force and motion. In transmitting power by a belt, the force is the resistance to slipping of the belt upon the pulley, and the motion is the speed of the belt. It must be obvious that in considering these two factors, they are independent of everything else. If the machinery does not run properly, and it is the fault of the belting, then one or the other of these two factors is wrong; and they are so curiously blended that if one is wrong the other is wrong. That is, if the resistance to slipping of the belt upon the pulley is insufficient to either drive the load upon the second pulley, or prevent the driving pulley from slipping around within the belt, a change of belt speed by enlarging the second pulley and increasing the speed of the engine, will increase the value of both the factors by reducing the resistance necessary upon the pulley and by increasing the rate of motion. To demonstrate this matter in figures, we will suppose that a certain belt will incline to slip a little in endeavoring to transmit 7½ horse power. The belt is running at a speed of 3,300 feet per minute, and the resistance upon the pulleys is 75 lbs. The two factors here to be multiplied are 3,300 feet travel and 75 lbs. resistance, giving 247,500 foot pounds, or 7½ horse-power. We find that the belt is not quite equal to the task; so, by enlarging the second or driven pulley, and increasing the engine speed to bring the driven shaft up to the speed it was at first running, we increase the belt speed to 4,400 feet per minute, and to drive 7½ horse power at this speed it will only require 56¼ lbs. resistance upon the pulleys, thus securing a margin of safety of between 15 and 20 lbs. in resistance. We now find that the belt running at 4,400 feet per minute, and requiring a resistance of but 56¼ lbs., will easily drive a load which it failed to drive when running 3,300 feet per minute, and with a resistance of 75 lbs.

Lubricants.

In a paper on the lubrication of machinery, read before the Manchester Association of employers, foremen, and draughtsmen, by J. V. Wilson, the opinion was expressed that the best oil for all kinds of bearings was a mixture of animal or vegetable with mineral oil, this mixture neutralizing the acidity developed in one case and the oxydizing tendency in the other. Mineral oils alone he considered unsatisfactory as lubricants for bearings.

With reference to cylinder lubrication, he noted that the conditions are the liberation of natural acids from vegetable and animal fats and oils, and that these acids could not be removed by any process of refining. He thought hydrocarbon oil the best for use in a steam cylinder, or in the cylinder of a hot-air engine, and that the thickest oil that could be introduced was the best. A small amount of animal or vegetable matter might be mixed with the hydrocarbon oil in the instance of steam or hot-air engines, but in the instance of gas engines hydrocarbon oil should be used without admixture. Mr. Wilson gave tables of the results of experiments supporting his views.

Boiler Maker's Punch and Shear.

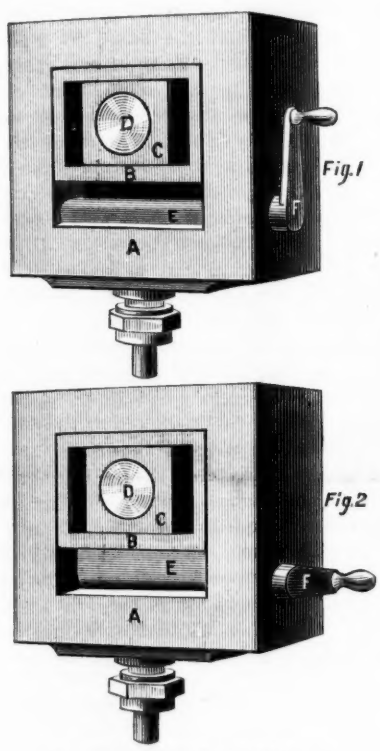
The large engravings shown herewith represent a boiler maker's punch and shear, made by Robert Kent, 45 to 49 Jay street, Brooklyn, N. Y.

Each of these machines is made in three different sizes, the punch being made with a gap of 24″, 33″ or 36″.

The 24″ gap machine will punch a ¾″ hole through ¾″ iron; the 33″ gap, a 1″ hole through 1″ iron; and the 36″ gap, a 1¼″ hole through 1¼″ iron.

The shears are made with a gap of 27″, 35″ and 36″, and will shear ¾″, 1″ and 1¼″ iron, respectively.

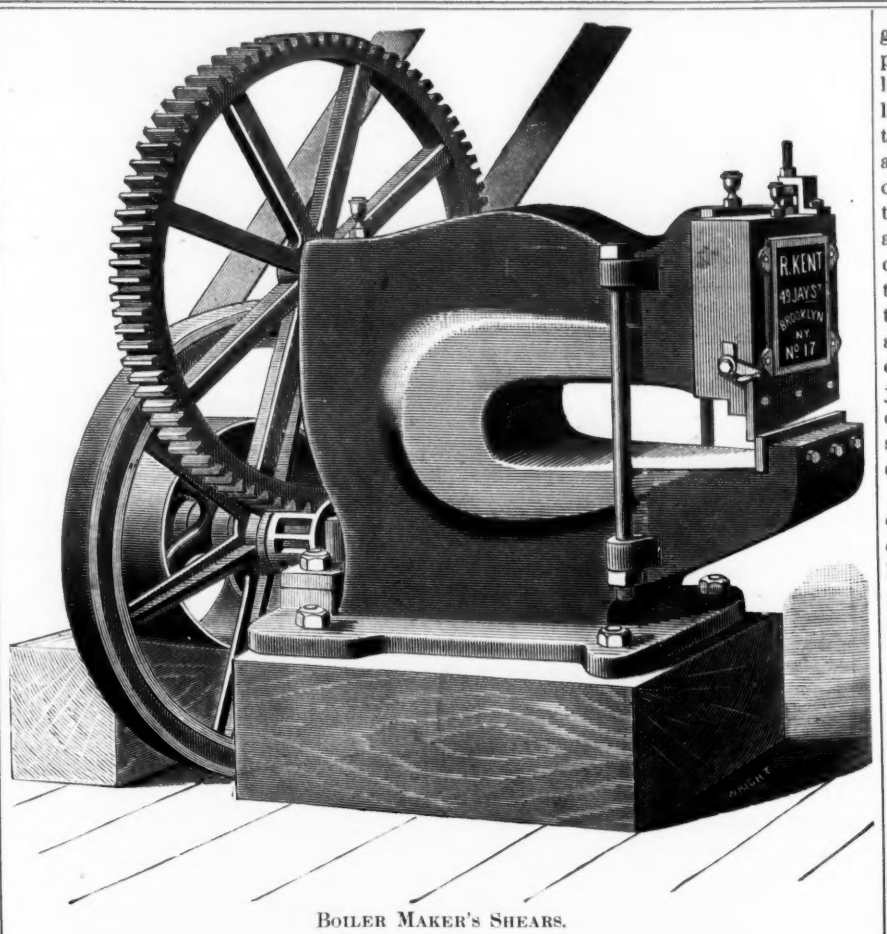
The detached engravings, Figs. 1 and 2, represent the independent stop motion used with these machines. In these engravings, *D* represents the eccentric end of the shaft, which works in the usual box *C*. This box is inclosed in a wrought iron box *B*, by means of which it imparts vertical motion to the shear or punch. *E* is a tumbler, which is made, by the operation of the handle *F*, to assume the different positions shown in the two figures. When in the position shown in Fig. 1, as the shaft revolves the gravity of the head will carry the knife or punch down until stopped by contact with the metal being



INDEPENDENT STOP MOTION.

worked, when the further rotation of the shaft carries the box *B*, through the blank space shown between *B* and *E*, and again raises the head. By turning the handle *F*, to the position shown in Fig. 2, the head is forced to travel the full distance of the stroke of the eccentric shaft. It will, of course, be understood that the tumbler *E*, may be left constantly in the position shown in Fig. 2, when the punching or shearing will be regular and continuous, or the punch or shear may be brought down to the metal, and when observed to be right, the tumbler can be adjusted to make the stroke. Thus the shearing or punching can be done in the ordinary manner of adjusting the plates on the up stroke, or, where greater exactness is required, the knife or punch may be stopped each stroke for adjustment. The bolts shown connecting the jaws are for giving additional strength beyond that required to work the dimensions of plate given, and need not be used for those sizes.

Prices of locomotives and cars have fallen somewhat since last fall—perhaps 6 per cent. A contract was made about November last for several locomotives for $10,400 each, and the balance of the lot, of the same pattern, were let to the same works this week at $9,800. The fall is, perhaps, less than in most other articles, and there are not any signs of a wild rush for orders, which many seemed to anticipate a few months ago.—*Railroad Gazette.*

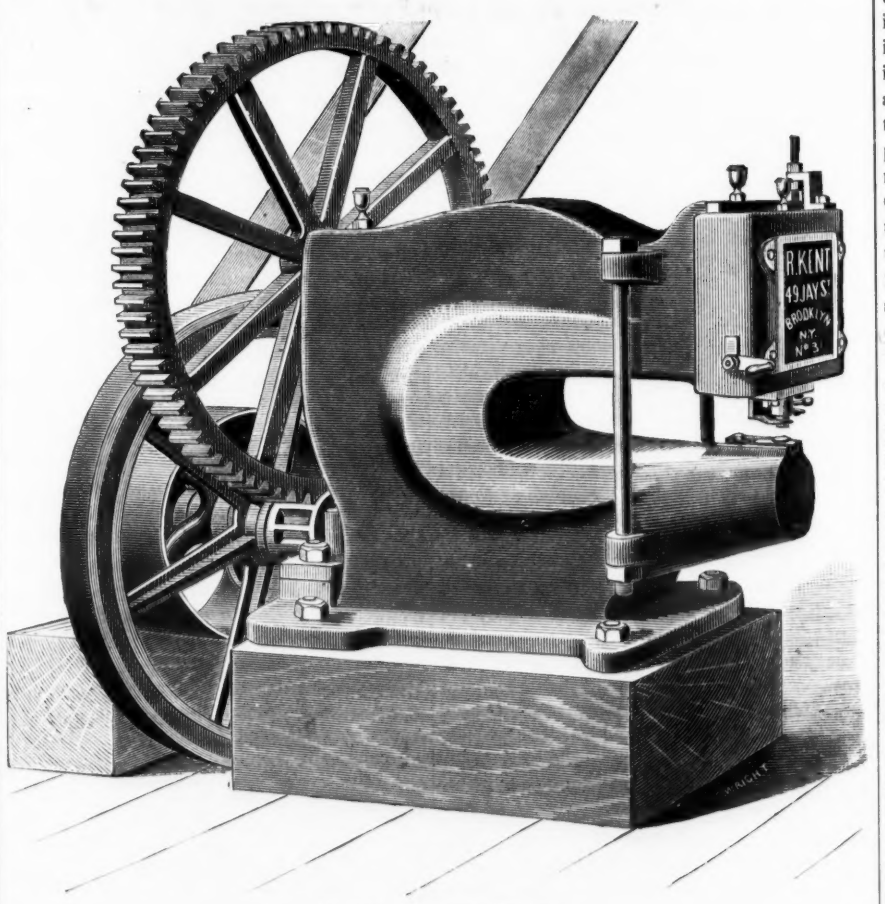


BOILER MAKER'S SHEARS.

Little Things in the Machine Shop.

BY FRANK H. RICHARDS.

I may have a weakness for magnifying the importance of little things. I think not. I think I am simply disposed to be just to little things. A freshly current anecdote of Emperor William sets him abreast of me. Said he, "The soldiers have never seen me with my coat unbuttoned, and they never shall; it is the one button unbuttoned that



BOILER MAKER'S PUNCH.

is the ruin of the army." It is no less true in the machine shop. The little things neglected make all the troublesome and unsatisfactory work, and where is the shop that has not a great deal more than enough of it? The contempt and neglect of little things is the greatest annoyance, the most fertile source of disaster, the chief enemy of progress and success all through the trade from top to bottom. It afflicts the apprentice no more than it afflicts the draughtsman, the pattern maker, the moulder, the blacksmith, the jour. machinist. Little things are still esssential things, and have a persistent way of enforcing their rights. If not attended to at the right time and in the right place, when the peculiar facilities are all at hand for their doing, they must often be done under most annoying conditions, and at one-hundredfold the cost. When you drill and tap the hub of a pulley, and put in the set-screws, don't bother your head to see whether the screws will go clear down, and don't file out the burrs in the hole. Wait until you—no, somebody else—is in the middle of an exhausting all-night repair job, in a cold and cramped place, half a mile from the shop, and with no half-round file at hand. Speaking of little things, whatever machine shop topic we may treat of, some little thing like this is always at hand for a sufficient illustration.

I am not sure but that this neglect and contempt of little things is a modern and growing vice, born of the methods—improved methods they call them—of these latter days. The minute subdivisions of labor which are a necessity of modern practice allow the consequences of any specific act of thoughtless omission or bungling commission to fall upon other shoulders than those of the perpetrator. A quarter of a century ago, when I worked in a little country shop and thought I knew everything and had to do everything, I learned to look ahead and plan for my own comfort and safety when I should reach another part of the job. Nowadays the other part of the job falls upon some other workman, and of course we look in vain for the old-time foresight, when the old time incentive no longer exists.

Still, the facts of life hold good. The test of skill is success, and success comes only of thoroughness, and thoroughness comprehends the minutest detail. A fellow has not to work very long at the trade before he gets above his business. He who has not far to go is the one most likely to get there. But when one gets above his business we all know that he gets no higher. It is right, I suppose, that we should all want to do the big things; but few of us, and rarely, get the chance of doing our best, or using our highest skill. Men of the highest mechanical ability in the land are, as some would regard it—many an apprentice, for instance—wasting their time in supervising the minute details of mechanical construction. How one would like to sit down and plan out the marvelous lathe, that is to eclipse all the lathes, with swing head and hollow spindle, and elevating tool-post, and correct speeds, and variable feed, and graduated screws, and all that; and he is not allowed to sit down for any such purpose, but must keep running around to see that drills are the right size, and holes tapped straight, and screws fitted, and who broke this casting, and when we shall get out this machine that was promised week before last, and why does Dan have these billious attacks so often, &c., &c.

The second-hand of a watch is a little thing, but men stake their thousands upon its evidence. The pencil of a steam-engine indicator is a little thing, but engineers trust it implicitly. From little things chiefly and fitly, we form our estimates of men, in the shop as elsewhere. The value and importance of a correct measure of a workman's ability can scarcely be exaggerated. One who has any hand at directing operations in the shop, and, as he should, also has the selection of his agents, is for his own interest and safety bound to be as true as possible in his judgments. He cannot afford to entertain any prejudices. He knows the value of a skilled workman, and has a vigorous horror of the incompetent and unreliable one. He does not want to miss the one when he comes along, nor to be betrayed into trusting the other with something that will overtax his poor abilities. Forty good men (which would be a vast collection) to whom you can assign work with confidence, that it will all come out right, will not worry one a fortieth part as much as one whom you know to be only certainly uncertain. In taking the measure of a man, a very little thing will sometimes be accepted as conclusive evidence. In the course of events I have a vacant lathe to fill. I have a new man, of middle age, who has been jobbing around the shop for a week or two, and he tells me that he has run a lathe all his life, and wishes I would give him a trial in that line. Well, he gets the lathe going, and pretty soon I notice that in turning a spot upon a 1¼″ shaft he stops the lathe to caliper his work. That settles him. My estimate of him is fully sustained by the developments of an hour or two. Now, any one is at perfect liberty to tell the next new man I try that I am prejudiced against lathemen who have to stop the lathe to caliper a simple piece of work. The forewarning would be a flimsy forearming. If he is incompetent he can't help betraying himself.

It is sad to have to note that the presumption is all against a strange man looking for work. Whenever you give him a trial, however hopefully you may regard him, e ee-

rience teaches you to put him at first, not where he will do the most good, but where he can do the least harm. It is not, according to the absurd idea that some unfortunates entertain, that skill is unappreciated, or that there is a deliberate purpose on the part of any one, or any malignant tendency in the natural course of events to keep one from knowing too much or developing too much ability. Skill is the thing that we are in search of. The trustable man is the greatest of all prizes. While I am thus looking for skill, I come along by a planer and I find a young fellow of whom I have some hopes trying to straighten a bar of iron, using the planer for an anvil. A combined planer and anvil is, like most combination tools, not very good for either purpose. He has one end of his piece laid over a tool upon the middle of the planer platen, and the other end of it hanging out over the corner, and he is whanging away upon the middle of it vigorously. Of course, when I tell him of it he will not do it again; but with what a pang of disappointment I see the trick, and how hopeless it is to try and develop into a good workman one so lacking in fine mechanical instinct as to have no respect, or sympathy, or care for a valuable machine.

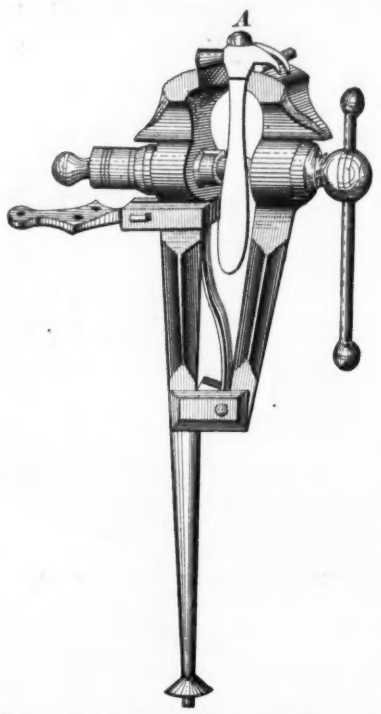
The machinist, as truly as the poet, is born, not made. We have had lots of talk about our apprentice *system*. It is somewhat like talking about snakes in Ireland. Too many of us have got into the habit of whining that the trade is going to the dogs. The dear social-science wiseacres, who have the well-being of the universe in charge, are wringing their hands and, for aught I know, breaking their hearts over the problem. We don't produce as many machinists of the old school as we used to because we don't want them. One of them is good to fall back upon, though, when you get into trouble. Whether the trade is running down or not, all the same, we are doing more work and better work than the world ever saw before, and I think we shall continue to do so for a year or two. Boys are unpopular in the shops, and why should they not be? Take every "machinist" that comes along looking for a job, and how long could you keep up the reputation of a shop? So take in boys, as they are always taken, on account of extraneous influence or persistent solicitation, with no thought of fitness or attempt at selection, and is it a wonder that they are unprofitable and unpopular? Boys should be tried and sifted even more carefully and thoroughly than journeymen are, and only the most promising retained. By all means give the boy a chance, but give the right boy the chance. It is no kindness, it is criminal to retain in the shop the young man who evidently lacks all mechanical instinct. Plenty of little things offer themselves in evidence for or against him, and from them an infallible estimate may be formed early in his career.

LETTERS FROM PRACTICAL MEN.

Method of Removing a Tight Hammer-Handle.

Editor American Machinist:

The following method of removing a handle from the eye of a hammer or other similar tool (one that a workman has an "affection" for, I mean), and which has persistently refused to have its head taken off, is perhaps worth making more generally known. A hammer, with attached handle, of exactly that description, was brought to me yesterday. The handle was made of a splendid piece of second-growth hickory of a good contour, and I may say generally "well fixed," as it could not be easily removed. It was placed upon a vise, as shown in the sketch, and a punch that nearly fitted the eye was used. The handle was literally riveted, and proved itself to be the greatest "sticker" that I ever saw. We used a ten-pound sledge upon it for about five minutes (after the eye had been thoroughly warmed), and when it did leave, it represented the cross-section of a good champagne cork, and was as good as ever for another "term."



REMOVING A TIGHT HAMMER HANDLE.

The reader will perceive that the handle was a little depressed by the punching process, so in this recess I placed a piece of coal, A, the size of a hickory nut and struck it with a sledge-hammer. I repeated the operation and successfully removed the handle. If your readers ever get a handle that won't budge, please send it to me, for I would like to see it.

W. DICKS.

Toronto, Ont.

The McGregor Slide-Valve—Valve Pressure.

Editor American Machinist:

I wrote a letter to you recently in which I called attention to this valve and the attending experiments, figures, &c., as in your issue of April 14, and recommended those interested to read carefully.

My letter was not an analysis, but merely a hint that here was a mine to be worked, and I also stated that the experiment served to prove what I claim to be a fact, and that is that the pressure on a valve is due to the area of ports, or other outward openings, multiplied by the pounds of steam per inch. This letter you did not publish, but you sent a request that I write more fully and give reasons for my conclusions.

The reader is supposed to have the article referred to before him, and he will find these figures:

		Pounds.
1st.	Pressure on back of valve	976.8
2d.	" " ports	163.6
3d.	" " points of contact	289.64
		Inches.
1st.	Area of back of valve	24.42
2d.	" ports	4.09
3d.	" points of contact	7.241
	" chambers	10.049

Steam..... 40 pounds per inch.

An experiment is made as shown, and the result is that a force of 408 pounds is needed to raise the valve off the seat. The value of this valve as a balanced one is reckoned on this as a base, and the valve seems to have but six pounds' pressure on it. I cannot agree with this, for two reasons, which I will designate:

First: The second example is not dealt with fairly. The area of the ports is all right, but in the test the chambers are open outwardly, too, as "the cock *N* is wide open;" therefore they must be counted as ports.

Second: There is an error somewhere in the estimation of the area of the chambers. He says, "The middle ones on the outside are 1.1" by 2.625"; then $2.625'' \times 1.375'' = 3.609''$." This is obscure, and efforts to clear it up vary some 2.3 square inches. However, to substantiate my claim as to valve pressure, which could be done anyhow, I will accept the area 10.049 as being correct for the chambers.

Since the ports and chambers are to be counted together, as they are both outward openings, we have $10.049'' + 4.09'' = 14.139''$ covered by the valve. This multiplied by 40 gives 565.56 pounds, pressure on the valve, which was raised with a force of 408 pounds.

Now, my claim as to what constitutes valve pressure might be decided as lost, but not so. It is obvious that if the third example (289.64) was correct, then less lift would be needed, and the explanation for my variation is this: The area carrying weight is so irregular that it would be simply impossible to set the lifting stem *exactly* in the center of the weight, therefore one side will raise first, and the true weight never be shown. This fact also sets aside entirely the first example (976.8) as it would not be so far out of center that only two-fifths of the weight would be shown, therefore I claim to have made my point.

Let us see if this is a balanced valve, as claimed. Mr. McGregor says it sustains a pressure of 6 lbs., while I say 157 lbs., therefore he might as well fill up the chambers and run with 163. The difference is due to the error in area I have noted. It can be shown that it is not 6 pounds, by moving the valve until the steam port is open, which will relieve the top some 25 pounds; therefore the valve would raise.

Mr. Baldwin has shown (April 28) that this valve will work harder with than without chambers, but does not say how much. I will venture to say that the common single valve in general use will do the work under a pressure of 110 to 120 pounds, and in this T. B. L. (April 28,) very nearly agrees.

This manner of balancing reminds one of the dry joke in Comstock's philosophy, where a man tries to lift himself over a fence by his boot straps.

W. V. WHITE.

The Injector as a Boiler Feeder.

Editor American Machinist:

Recently considerable discussion has been had in the AMERICAN MACHINIST and elsewhere, in relation to injectors as boiler feeders, both for and against, but as yet very little is comprehended concerning their practicability, irrespective of their merits as a philosophical phenomenon.

It is only within the last five years that the fact has become rightly understood and properly appreciated amongst intelligent engineers, that an injector, when properly constructed, will satisfactorily fulfill the requirements as a boiler feeder under all conditions of duty.

Some fourteen injectors are now being offered to the public.

It has been proved by a number of thorough practical tests, that for relative economy of steam and for constant duty the injector of the present time can be utilized as a boiler feeder in a most satisfactory manner.

There is no scientific work published that treats exclusively on the subject of steam jets as applied to injectors for boiler feeding; and when considering the great advancement that has been made and the wonderful improvements that have been presented in this direction, it is something to be deeply regretted that as yet no one has contributed a treatise furnishing information that is constantly being sought after by intelligent engineers regarding the science of steam jets, and their operation. The many defects and the serious annoyances attending the use of the injector during the early years of its use would necessitate a large volume to state the details, but by dint of untiring perseverance it has now been brought to a high state of perfection, and is fast coming into general use.

A certain writer has expressed himself in regard to this subject as follows:

"Reduced to its simplest terms, the invention of the injector is based upon the idea that the steam boiler should furnish directly the power necessary to supply itself with water."

Another writer has summed up the new scientific principles of the injector as four in number, that are combined and brought into play in the invention along with the principles and mechanical methods already shown:

"1st. On contact with the water the steam condenses, and communicates to it its velocity.

"2d. Condensation can only take place if the water is notably colder than the steam, and it is therefore necessary that the water already heated by the condensation of a part of the steam, shall be put in contact with uncooled steam.

"3d. The pressure of the steam jet obtained by the condensation of the steam may be notably greater than that of the motive or main steam pressure from the boiler.

"4th. Water may be thrown to a distance from a stationary tube within another one also stationary, communicating with a chamber wherein there is pressure, without any loss of the water occurring as a consequence of such transmission."

The explanation of the mechanical action of the injector is easily understood as follows:

The injector, when feeding a boiler utilizes the velocity of the steam pressure coming direct from the steam space of boiler through a pipe of required area to insure sufficient velocity according to the amount of water to be fed to boiler per hour.

The steam on entering the injector passes through the steam jet (which is shaped in the best possible form to increase the original velocity of the steam), when the steam in passing through the steam jet creates a vacuum in the suction pipe and draws the water to the injector. The contact of the water with the steam condenses the steam, and the velocity of the steam is imparted to the water, creating a momentum of the latter equivalent to about one half the original velocity of the steam as it passes through the steam jet when entering the injector, but of sufficient velocity to feed against the counter pressure of the same boiler at all times, and under all pressures.

It has been successfully demonstrated that with an injector it is possible to lift water 26½ feet vertically. Hot water, up to 150° Fahr., can also be lifted. Boilers can be fed with hot water without any heater, or with a heater if so desired. Some injectors will operate under any variation of steam pressure without requiring adjustment, and if the suction pipe should become heated, it makes no difference in their working. The movement of only one handle is one of the essential features in some injectors. No lubrication is necessary with any injector. To sum up the whole subject of the injector as a boiler feeder, it is only required to state that, when properly constructed, it has proved to be a most efficient instrument for the purpose intended.

A. ALLER,
109 Liberty St., New York.

Exclusiveness of some Shop Owners.

Editor American Machinist:

Being a drummer, and drumming up trade in the machine supply line, I am forced, or force myself, into the presence of all sorts of people, have opportunities to pick up a good many valuable ideas, run against all sides of human nature, and see enough of the ludicrous to make a mule laugh every day.

It's amusing to see how much of a pompous ass the proprietor of some 7×9 machine shop can make of himself. He is generally a little man, with "No admittance" over the door, and his aspiring form in the door to carry out the injustice. No, he is not in want of anything in our line; in fact, not in want of anything at all.

"Lots of customers, then?"

"Well, no; I'm not overstocked with customers; trade is not over brisk."

"I see you have 'No admittance' over the door. Don't you think that drives away customers?"

"Guess not; it's only meant for loafers and agents."

"Yes, but it don't say so, and if it did it certainly would have but little effect on the loafers, if they cared to get in; and no agent worthy of the name would pay any attention to it."

Cheek generally softens these men, and in some way I find myself seated in the office,

"The fact is," the little proprietor begins to explain, "we have some things of our own get-up which we don't want our competitors to see, for they are all consummate thieves, and if they can get a hint of our methods, they will drop on to them directly."

Now, Mr. Editor, when you hear this story, you may set it down as a lie, whether in the large shop or the little one. They either have nothing worth seeing, and are ashamed of it, or they have some profitable device invented by the foreman, or some of the men from whom they wish to keep the knowledge of its real value, or, what is more likely, they have stolen so many things from other people they fancy it's policy to keep dark.

Is it not safe to assume that the man who has stolen, or borrowed, or adopted some man's design for a lathe frame, and another for the head-stock, taken the foot-stock, with all its defects from another, combined slide-rest attachments from others, and in this way brought out his new design of lathes, has also stepped into every machine tool-shop within reach and captured all methods and appliances applicable to his business, and set them up as his methods?

No, Mr. Editor, you need not assume anything about it; it's a fact with "no admittance" on the door, and a pretty tolerable small man as proprietor putting on airs. Did you ever see a half-drunken man who did not fancy he could make you believe he had not been drinking? And did you ever see a brain thief who fancies he can make you believe every one else steals designs?

Possibly all firms who employ this "no admittance" business are innocent of the charges above, and really employ the exclusive feature for the purpose they claim—that is, to keep people from coming in and bothering their men. But is not this simply an admission of a want of manliness of men, foreman or management? Is not a hint to the men, making them understand they are paid for a day's work and are expected to do it, or a hint from the foreman to a loafer or to a visitor not to bother the men, or a little policy on the part of the proprietor a good deal better investment? To keep the no-admittance factor in full force in an establishment of any magnitude requires the presence of two men when the same money would hire four boys, and four boys could invite in and show around a good many visitors, in a pretty large establishment, every day. With this advantage in the first case, the manufacturer has to seek his customers always outside his own establishment, and many times outside his own town, and in the latter case finding unexpected customers, dropping in on him unawares, and traveling advertisers scattered all over the country. Is the drummer, when asked, as he is every day, who builds the best portable engines, going to extol the merits of Vick's engine after he has been fired out of the factory by the upstart of a proprietor? Not much, when he recalls Burt's kindness in showing him around his engine-building establishment. The drummer is a good deal like other people, always remembering a kick, while he seldom forgets a common civility.

DRUMMER.

Turning the Exhaust from a Steam Pump into the Suction.

Editor American Machinist:

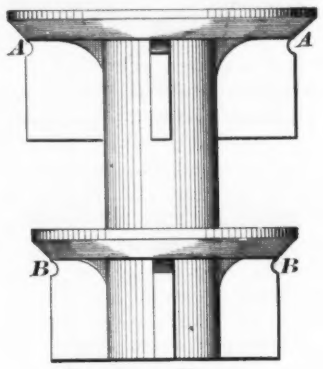
In your questions and answers (April 14) I see C. F. D. of Pottsville, Pa., asks: Who was first to turn the exhaust steam from a steam pump into the section? *A.*—Mr. John H. McGowan, steam-pump builder on Central avenue, below Second street, Cincinnati, has a patent on the arrangement.

B. B.

To Prevent Leaky Throttle Valves.

Editor American Machinist:

It has been found by close observations that the throttle valves of locomotives begin to leak soon after the engines are sent out of the shop. Upon examination, it will be found that the steam has cut deep ruts or grooves in the lower part of the valve, as indicated at *B, B*, in the accompanying sketch, opposite the webs. The upper seat will



THROTTLE VALVE.

appear to have suffered but little at the corresponding points, *A, A*, in the sketch. The webbs are shown cut away with a round nose tool, both at *A, A* and *B, B*. This entirely overcomes the difficulty alluded to, and does not interrupt the free passage of steam.

OBSERVER.

Springfield, Ohio.

Turning the Exhaust from a Steam Pump into the Suction in 1850.

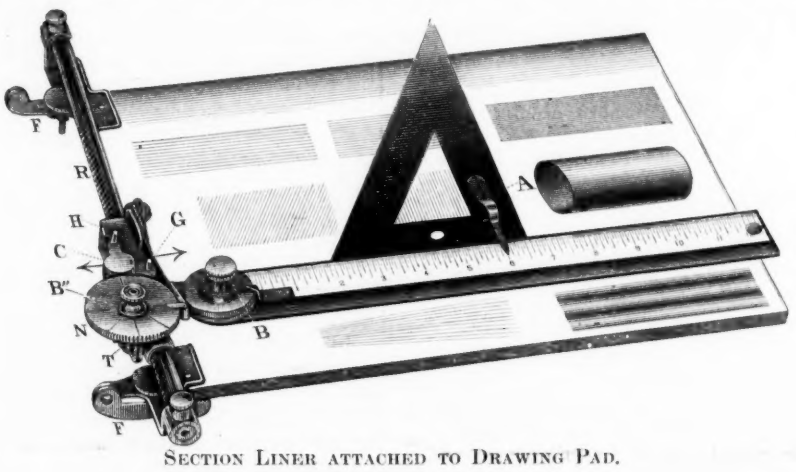
Editor American Machinist:

As will appear from the following extract from the late Mr. Worthington's pamphlet on the Worthington Engine, the correspondent to whom you refer in your April 21st number will have to search further back than 1862 to find who first turned the exhaust of a steam pump into the suction:

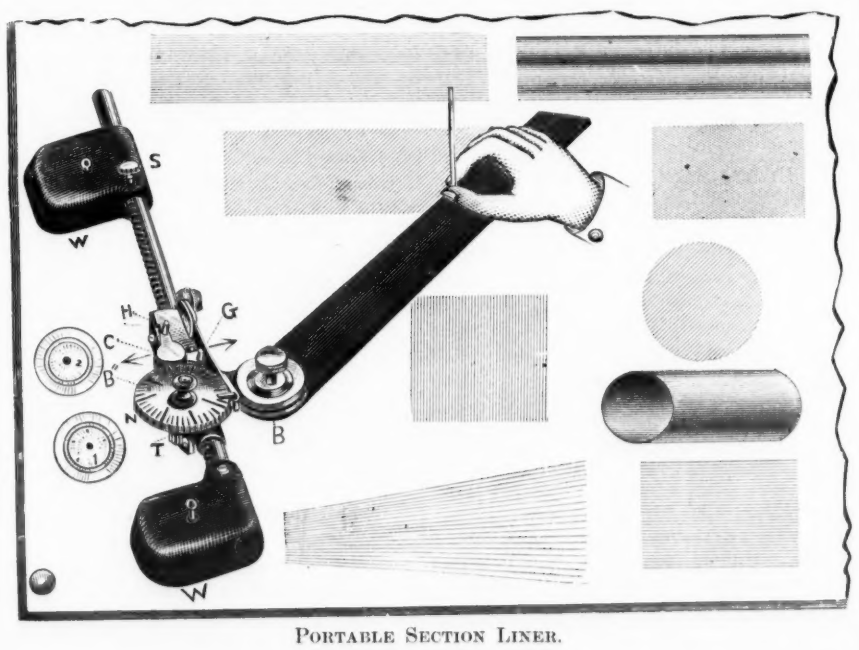
"The practical efficiency of the engine was due, in no inconsiderable part, to the efficiency of its condensing apparatus. While adverting to condensing apparatus, let me record the fact that, in the year 1850, I furnished a steam pump for raising the water from a deep well at Oatlands, L. I., the estate of De Forest Mannice, Esq. In order to avail of the partial vacuum due to the height of the pump above the supply, the exhaust of the engine was connected to the supply chamber of the pump, thus converting the engine into a condensing one, with considerable increase of power; and this I have done several times since, although—as the arrangement is efficient only when applied to pumps working on a high supply column—it is not always, nor indeed often, applicable. It is, however, sometimes desirable to get rid of the exhaust steam in a quiet way, as in mines, which would justify the arrangement, even if no increase of power resulted."

BROOKLYNITE.

We have received several replies to the query of a correspondent as to who was the first to turn the exhaust steam from a pump into the suction. Charles Tyson, Philadelphia, Pa., writes us to say he conceived the idea as early as 1859, and explained it to Jacob Neafie, of the well-known engineering firm of Neafie & Levy, of Philadelphia; also to Mr. Wiegand. Either of these gentlemen, he believes, will confirm his statement.



SECTION LINER ATTACHED TO DRAWING PAD.



PORTABLE SECTION LINER.

Gardam's Tee Square and Section Liner.

One of the most tedious processes that a draughtsman has to perform is the proper lining or shading of cylindrical shapes. Many a fine drawing in other respects has been disfigured by a badly shaded cylinder, or an improperly spaced section.

To shade a cylinder in a satisfactory manner (especially when an individual is not a professional draughtsman, or when he is engaged upon a kind of work that requires but little shading) is a long and tedious operation. The section liner shown in the accompanying engravings was made for the purpose of accurately lining cylinders and sections, whether by skilled or unskilled draughtsmen. The engravings represent two applications or forms of this instrument. One shows the instrument attached to a regular drawing pad. It is very simple in construction, consisting of a compressed round steel bar *R*, having teeth cut upon one side, as shown, to form a rack, and secured to the drawing pad by the clamps, *F, F*.

A pinion *T*, is attached to the lower end of the shaft, and is so arranged that it may be thrown in and out of gear with the rack, as desired. A graduated and toothed wheel *N*, is attached to the top of the shaft alluded to, and is secured in place by the thumb-nut *B"*. The pinion is held in gear with the rack by a flat steel spring *H*.

When the pinion is in gear the square is moved along the bar by turning the wheel *N*, but by turning the cam *C*, the pinion is thrown out of gear with the rack, and the square may then be quickly moved to any desired position. The spring catch, which engages the teeth of the graduated wheel to be used in spacing lines, may be thrown out of gear by moving the cam *G*. The blade of the square has a paper scale upon it, by means of which, with the assistance of the point *A*, secured to the set-square, vertical and inclined lines may be accurately drawn. By means of the thumb-nut *B*, and the graduations upon the circular protractor, the blade may be set at all angles.

A projection upon the plate attached to the blade fits into teeth upon the protractor, so that an angle may be secured at once without any testing process whatever. For shading cylinders a number of discs of card-board accompany each instrument, one of which, suiting the diameter of cylinder to be shaded, is to be placed upon the face of the wheel *N*.

The card-board disc is secured in place by removing the nut *B"*, placing the card-board upon the screw and replacing the nut. The graduations upon the card-board disc are then to be used instead of those upon the wheel *N*.

This section liner, as shown in the engraving described, may be used upon all parts of a large drawing-board by removing the clamps, *F, F*, and substituting two heavy cast iron weights, *W, W*, as shown in the engraving of portable section liner.

As an extra precaution for preventing these weights from moving upon the board a needle-point is inserted in the center of each.

The right-hand edges of the weights are made parallel with the bar, so that the latter may be quickly adjusted to a line upon the board.

The blade is here shown set to an angle, with a hand represented in drawing the lines of a section.

The figures 1 and 2 will give the reader an idea of how the paper discs are graduated. The spaces are made to correspond with examples furnished by the best authorities in drawing. Specimens upon the board show the various kinds of work which may be executed by the aid of this instrument.

It will be understood from the description that this instrument is a combination of a tee square, protractor and section liner. It is positive in all its movements, and divides or measures in fractional and decimal parts of an inch. It can be readily adjusted back to lines previously drawn, or for the purpose of drawing lines in spaces that were skipped. The blade of the square can be lifted from the work to inspect the same, it being pivoted to the bar.

These instruments are made by W. Gardam & Son, 96 John street, New York.

The Effect of Oil in Boilers.

In a paper recently read before a Lyons' society, M. Bour, engineer of the Lyons Boiler Association, noted some difficulties experienced with the boiler of a steamship running on a small lake, from the presence of grease. The boiler had an internal flue with return tubes, and was properly tested and certified. The boiler was fed from the condenser, and in a short time commenced to leak, and, after attempts to keep it tight for any considerable time failed, it was decided to try a new boiler, which was done with substantially the same results. Upon examination, the light-colored mud found in the boiler was carefully treated, and found to contain a large amount of grease. The boiler was filled and cleaned, soda crystals and quicklime being added to the water to remove the grease. It was then fed directly from the lake, when no difficulty was experienced. Upon again attempting, however, to feed from the condenser, the old difficulty was experienced. M. Bour notes that in the old boiler, fed in the same mnaner as the new ones, no difficulty was experienced; hence, it would appear that the real cause of the injurious effect of the grease is not understood. M. Bour also notes that when water is carried over with the steam an exceedingly hard substance is formed, which sometimes breaks the cylinder heads, but that this substance is not formed when mineral oil is used.

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

American Machinist Publishing Co.

HORACE B. MILLER, Pres't.

JACKSON BAILEY, Vice-Pres't.

LYCURGUS B. MOORE, Treas. and Sec'y

96 Fulton Street, New York.

JACKSON BAILEY, Editor. HORACE B. MILLER, Business Manager.

LEWIS F. LYNE, F. F. HEMENWAY, } Mechanical Engineers.

The American News Company,

Publishers' Agents, New York.

The International News Company,

11 BOUVERIE STREET, (Fleet Street), LONDON, ENG., will receive subscriptions for the AMERICAN MACHINIST at 16/8 per annum, postage prepaid.

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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, MAY, 12, 1883.

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The Iron Trade Situation.

The condition of the iron trade may be taken as a very fair barometer of general business. Its ups and downs influence all trades, as almost every industry is dependent in some measure upon iron. In 1879 the boom in the iron trade was an unmistakable indicator of more prosperous times. The selling price of No. 1 foundry pig iron went up from $18 a ton in the New York market until in the earlier part of 1880 it reached $42.50 a ton, at which price it remained for several weeks. Within the last ten days it has declined to the lowest price since the rise in 1879. Pig iron is now selling at $22 for No. 1 and $20 for No. 2, with the outlook not very favorable for an early advance. Recent iron-trade failures have not only depressed prices, but have, to some extent, disturbed confidence and checked important enterprises. Those who have contracts to fill requiring large quantities of iron will doubtless receive some benefit from the decline. It is unlikely that prices of ordinary shop machinery will be directly affected by the reduction in pig iron. The production has already been restricted by the blowing out of many furnaces, and if the demand does not soon improve, many others will blow out and remain idle until the tide again tends upward.

Trade in manufactured iron has been dull for many months. There are some indications of another extensive lock-out of iron workers in the Pittsburgh district after June 1st. The manufacturers ask a ten per cent. reduction of the sliding scale for labor. Whether the workmen agree to this reduction or not, they are almost certain to be the losers. On the other hand, considering the state of the trade, the manufacturers will probably be benefited even should the mills be idle for several weeks.

Consul E. G. Van Riper, whose efforts to further the introduction of American machinery in Russia, were brought to the notice of our readers in the March 17, 1883, issue, has arrived at Moscow, as we learn by a letter from him just received. The Consul feels greatly encouraged over the prospect of making his office an important aid to the advancement of American industrial interest in that country.

Underground Street Service.

The absolute demand, in large cities, for the placing of telegraph, telephone and electric lighting wires under ground is interesting as a means of noting the rapid growth of the use of electricity. Twenty years ago there would have seemed to be no probability that such a demand would be made, the few telegraph wires that then adorned the poles along the streets being considered ornamental rather than otherwise—an evidence of advancement, to be pointed at with considerable pride. What was then ornamental—or, what is the same, was considered so—has, by rapid multiplication and in a very short time, come to be a positive nuisance, to be abated at any cost. The problem of locating the large and rapidly increasing number of wires under ground is evidently one of somewhat difficult solution, the exact difficulties in the way being, evidently, not entirely understood, and by no means fully provided for by the numerous patents relating to the subject. Manifestly, these difficulties are intensified by the use made of the streets for gas and water pipes, and more recently, in several cities, by the pipes of steam heating and power companies.

The promiscuous use of the streets, under ground, by a multitude of companies, for varied purposes and in ways to suit themselves, is hardly less a nuisance, and probably even more dangerous, than the wires strung above ground.

Considering that the wires must go under ground, and that the underground service is likely to be indefinitely increased by added facilities for present purposes, as well as the probability of future discoveries calling for further means of distributing the comforts and necessities of life, the folly of a further indiscriminate and unsystematic use of the streets for these purposes is apparent. In the manner in which they are now used, economy of space is the last thing considered, and even now, under some of the streets of New York, a complication of wires and pipes exists that renders further use for similar purposes hazardous.

This, to say nothing of the state of demoralization in which the streets traversed by a multitude of service pipes and wires are likely to be kept by digging for repairs and additions, make it worth serious consideration whether the time has not already come for tunneling the principal streets of most large cities, the tunnel to afford room for water, gas, steam and pneumatic pipes, as well as electric wires for all purposes, and for others that may be added in the future. This really seems the only feasible way out of the difficulty, which must continue to grow worse until some means of relief are afforded.

Treatment of Commercial Travelers.

Among our "Letters from Practical Men" this week is one from a commercial traveler, otherwise "drummer," for machinists' supplies, relating a little of his experience with a certain kind of shop proprietors. While, as a rule, machine shop managers treat men who come to sell them supplies, as well as those who come to buy, with due courtesy, the reverse is sometimes the case. Whether the man solicited wishes to buy or not, the fact need not change his demeanor towards the solicitor. There are shop owners and shop managers who seem to feel that duty urges them to snub every commercial traveler who chances to call with something that does not seem to be wanted at the time of their visit. They are "too busy to talk," have been "drummed to death," and are "so crowded with business that we have no time to waste in talking," spiced with a few oaths, perhaps.

As our correspondent remarks, these men usually run a seven-by-nine shop, and are not overburdened with orders. The chances are that they never expand beyond eight-by-ten proportions. They are usually puzzled to understand why other establishments that begin on just as small a scale keep increasing year by year, are everywhere well spoken of, and succeed far beyond what they themselves seem able to achieve. The cause need not be sought altogether in superior productions. The "good-will" is an essential part of a concern, and we never knew of a single case where that part was improved by rough treatment of commercial travelers. Of course, there are occasional solicitors who are chargeable with incivility, but there is no excuse for roughly receiving every solicitor because he comes to make sales instead of purchases.

Buying Books.

A standard inquiry—one that can always be depended upon—is what books to buy and study in connection with some branch of practical mechanics.

If anything is more common than the inquiry as to what books to buy for this purpose, it is the expression of dissatisfaction with such books after getting them. This dissatisfaction is not generally because the books are worthless, but because those who buy and use them expect quite too much from them. A little consideration should demonstrate to any one that when a book treats the manipulations and processes of some trade, no matter how pretentious it may be in size, it can cover but few of the details involved. Those touched upon may be important, but the ones untouched will be so numerous, by comparison, that the former will look insignificant.

Those who buy books treating mechanical subjects—especially mechanical manipulations—should not expect impossibilities of the writers. Particularly they should not expect infallibility in the author, or expect not to find some statements with which they, probably correctly enough, disagree. Buying such books with the idea that they are repositories of universal, all-sufficient knowledge, will always be in the highest degree unsatisfactory. One item of information obtained from a book—information that may be of service a thousand times—may be worth several times the price paid.

It is a difficult matter to advise what book or books to buy for a specific purpose. What will be entirely satisfactory to one reader may be entirely unsatisfactory to another, and no one can judge of this but the reader himself.

Meeting of the Master Car Builders' Club.

The last meeting of this club for the season was held at their rooms on Liberty street, April 19, the subjects for discussion being draw-gear, dead-blocks and car trucks. The general expression of the members was that the lack of uniformity in dimensions of dead-blocks was the cause of serious trouble—in many instances a construction being maintained that rendered the coupling of cars unnecessarily dangerous. The representatives of three patent couplers, more or less automatic in their operation, were present and explained the construction and operation of their several devices. In the discussion the advisability of an automatic coupler was sustained, and the statement made that railroad companies were ready to adopt the proper device, which must be interchangeable with the present arrangement, so as to permit gradual substitution. In this discussion the assertion was made that there was quite as much danger to life in uncoupling as in coupling cars. It was also asserted that considerable difficulty was experienced in introducing couplers intended to protect the lives of the trainmen, from the objection of the men themselves.

The President stated that several years ago he fitted an entire train with automatic couplers, and that the experiment was unsatisfactory mainly through the opposition of the trainmen. In the same line one of the exhibitors of automatic couplers related that a brakeman condemned his coupler, dismissing it after seeing it operate, with the remark that "any farmer can switch with that."

On the subject of trucks the President was of the opinion that with twenty tons the standard truck was loaded to its maximum, and that this ought to be the limit. The tendency of managers was to ask for more load, so that if car builders advised to load to twenty-five tons they would ask them to go still further. Since the increase in load the breakage of cars had increased 50 to 100 per cent.

The point was made during the discussion that no matter what the capacity of the car was fixed at, the orders would frequently be to load four or five tons higher. Mr. Smith believed, in opposition to others, that the carrying capacity of cars should be largely increased. The cheapest way to meet the problem of carrying the increased quantity of freight that must be carried was by increasing the capacity of the cars and using heavy engines. He thought that the final limit to the capacity of cars would not be less than fifty tons.

During the discussion the opinion was expressed that within the next ten years railroads would be called upon to transport double the amount of freight they were now transporting, and the demand must be met by doubling the speed of trains, or doubling the carrying capacity of cars.

Literary Notes.

How to Build a House is the title of a neat architectural publication issued by the Co-operative Building Plan Association, 24 Beekman street, New York. It contains designs for villas, cottages, farm-houses, and suburban residences. Price, 50 cents.

The "Spring Extra" of the *American Furniture Gazette*, published at 150 Dearborn street, Chicago, is a unique number, printed in colors, and showing the latest

styles of furniture, which, by the way, are getting to be rather elaborate, not to say extravagant. A sketch of old and new Chicago, illustrated by pencil sketches from a furniture point of view, forms the main features of the number.

The *American Artisan*, of Chicago, improves with every issue. It is an able and attractive representative journal of the stove, tin and house-furnishing trades. It abounds in technical and trade information. Published semi-monthly at $1 a year.

The Canadian Magazine of Science and the Industrial Arts is published monthly by The Burland Lithographic Co., Montreal, at $2.50 a year. It contains the official Canadian patent record.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(171) F. M. B., Worcester, Mass., asks: In tapping cast iron, is it better to use oil or to tap dry? *A.*—It is customary, and generally better, to use oil.

(172) M. C. B., New York, asks: Can you tell me if there is a lacquer that will keep brass bright when exposed to the weather? *A.*—A great variety of lacquers are used for this purpose. One is: Ground tumeric, one pound; gamboge, 1½ ounces; gum sandarach, 3½ lbs.; shellac, ¾ lb.: rectified spirits of wine, 2 gallons. Dissolve and strain, and then add one pint of turpentine varnish. Heat the articles to be lacquered, and apply with a soft brush.

(173) C. E. R., Gloucester, N. J., sends a sketch of a side tool, and writes: Please tell me whether this is a left or a right hand tool. It certainly cuts to the right, and why do dealers in tools call it a left-hand tool? *A.*—The tool is what is known to machinists as a left-hand tool. Why it was originally so called we do not know. Perhaps because tools cutting in the other direction are more common, perhaps because the rake is the same as that of a tool for cutting a left-hand thread, or perhaps for some other reason.

(174) G. C., Philadelphia, Pa., asks: 1. Can you give me a formula for determining the quantity of air delivered by a fan blower of given dimensions; also the horse power required to drive the fan? *A.*—We know of no way to determine this except by experiment. There are many conditions that influence both the air delivered and the power required, to which no calculations are applicable. 2. What is meant by the eccentricity of the fan, as mentioned in text-books? *A.*—It is the distance the fan is set out of the center of the inside of the case.

(175) L. V. M., Grand Rapids, Mich., writes: I wish to calculate, in terms of horse power, or otherwise, the amount of steam used in a drying device I have. Can I do so by measuring the steam by a water meter? *A.*—You cannot measure the steam used with a water meter. You can measure the water supplied to the boiler. The best way to determine the steam used is to measure the water evaporated in the boiler and used in the device. We do not know of any accurate steam meter. By pumping the boiler from a measured tank or barrel, you can determine how many pounds of steam you use per hour or per day.

(176) J. H., Newark, N. J., writes: I am building an engine 6½″x10″. The valve travel is 1¾″; steam lap, ¼″; exhaust lap, ⅛″. The steam ports are ⅝″; bridges, ⅝″; exhaust port, 1¼″. The engine is to run 100 revolutions. I want to ask: 1. At what point will steam be cut off, and also where the exhaust will open and close? *A.*—Cut-off at about 9″; exhaust will open when the piston is 1-10″, and close when it is 1/16″ from end of stroke. 2. What will be the power of such an engine, with boiler pressure 80 lbs.? *A.*—You neglect to give the length of ports. Probably about 6 horse power. The engine would be better if the valve had more outside lap and more travel; say, 1/16″ lap and 2⅛″ travel.

(177) R. H., Cleveland, Ohio, asks: 1. In finishing a large crank-shaft for a steam engine is it best to use a spring tool and coarse feed, or a stiff tool and somewhat finer feed? *A.*—We should not advise the use of a spring tool for accurate work. 2. In building a new lathe, is it better to fit the center in live spindle and cut the thread after the lathe is set up and belted, or to do so in turning the spindle? *A.*—A very common practice is to cut the thread when the spindle is nearly finished, and to turn the spindle on a center fitted to the finished hole in the spindle. Of course care must be exercised in keeping the spindle trued up by the hole during the turning, the job being altogether a nice one.

(178) Frank, Baltimore, Md., encloses a drawing of steam cylinder and piston, and writes: Some time ago we had an upright engine to repair, which had always had a thump about it, even when new, and which several machinists had failed to remove. We are again trying to discover the cause. What I want to ask is: If the piston travels entirely over the port, as per sketch, and as this one does, will it not cause a noise? *A.*—A piston that travels entirely past the port will be driven hard against the side of the cylinder opposite the port by the action of the incoming steam, and the noise of the blow will be in proportion to the pressure of steam and looseness of the piston. It is almost certain to produce a disagreeable noise in a vertical engine, and sometimes will in a horizontal engine.

BUSINESS SPECIALS.

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James W. See, Consulting Engineer, Hamilton, O.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

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R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

For sale, 25″ lathes of best designs from new patterns. George A. Ohl & Co., E. Newark, N. J.

Chas. T. Porter, Mechanical Engineer, Tribune Building, (Room 42,) New York City.

H. E. Penney, manufacturer of Steel Spring Cushioned Helve Hammers. Photo and circular on application. Minneapolis, Minn.

New tool chest, price $10. See description in AM. MACHINIST, April 14th, or send for circular. Goodnow & Wightman, 176 Wash'ton st, Boston, Mass.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Boiler Scale.—Parties having fine specimens for sale or loan, for exhibition, address Jas. F. Hotchkiss, 84 John street, New York.

A handsome monthly journal sent free to engineers and mechanics. Enclose twelve one-cent stamps for year's postage and receive paper. Money Saver, 95 Liberty street, N. Y.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

"Patent Binder" for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address by mail for one dollar. American Machinist Publishing Co., 96 Fulton street, New York.

Free—"Useful Hints on Steam." A book of 96 pages, illustrated. Valuable to engineers, steam users and those about purchasing steam machinery. By mail, 15 cents, or free on personal application. E. E. Roberts, 107 Liberty St., New York City.

We will pay 25c. each for copies, in good condition, of the issues of January 1st and January 8th, 1881. Those sending us either of the above dates will kindly write their name and address on the wrapper for identification. AM. MACHINIST Publishing Company, 96 Fulton street. N. Y. City.

Wanted—Correspondence with engine builders, boiler makers, and supply dealers in steam goods. We manufacture the *cheapest* Injectors and best Steam Jet Pumps in this country, and offer to *live men* the most liberal terms ever named. Drop postal for particulars to J. B. Sheriff, Son & Co., 68 Water St., Pittsburg, Pa.

"Useful Information for Steam Users"—a 100-page illustrated pamphlet, carefully compiled from the best authorities, on the care and management of the steam engine and boiler, with hints for engineers and firemen. Engineers everywhere should have this work. Send 25 cents in P. O. stamps for a copy. The J. N. Mills Publishing Co., 145 Broadway, New York.

Now ready for delivery, volume 5 of the AMERICAN MACHINIST, comprising the year 1882, (52 issues) complete with index, in substantial book form. Also a few remaining of volumes 3 and 4 comprising the years 1880 and 1881, can be sent anywhere by express. Price of each volume, $4.00; express charges to follow. AMERICAN MACHINIST Publishing Company, 96 Fulton street, New York City.

For a strictly first-class automatic engine, from 10 to 60 horse-power apply to the Straight Line Engine Company, Syracuse, N. Y.; medium or high-speed; perfect balance; fewest parts and fewest working joints; uniform speed at all ranges of power or steam pressure; the best material and workmanship in all vital parts; the most correct distribution of iron; unexcelled in smooth running.

Chordal's Letters.—John Wiley & Sons, 15 Astor Place, New York, have now ready a new and enlarged edition, with six additional plates, of Chordal's Letters, comprising the choicest selections from the series of articles entitled "Extracts from Chordal's Letters," which have appeared in the columns of the AMERICAN MACHINIST; with a steel portrait of the author, and upwards of fifty original illustrations by Chas. J. Taylor. One volume 12 mo. of nearly 400 pages, cloth, $2.00. Will be mailed and prepaid on the receipt of the price.

MANUFACTURES.

A new paper mill is to be erected immediately at Bradford, Mass.

The Cummer Engine Company, Cleveland, O., propose to enlarge their works.

Wallace & Sons, Ansonia, Conn., have purchased a 500-horse power Wheelock engine to run one of their mills.

Some of the brass and rolling mills in Ansonia, Conn., have reduced their working time to four days a week.

The Kewanee Manufacturing Company, Kewanee, Ill., are making extensive additions to their machine shop.

The Clemens Foundry and Machine Company, New Haven, Conn., have recently turned out some very neat hand-lathes.

The National Pipe Bending Company, of New Haven, Conn., have been authorized to increase their capital to $100,000.

Hoggson & Pettis, New Haven, Conn., die-sinkers and machinists, are now putting down a foundation for a new shop building, four stories high.

The Frost Manufacturing Company, of Galesburg, Ill., have just placed in their shops new machinery for the manufacture of engines, shafting, etc.

Aberdeen, Miss., voted to donate $10,000 to the Canton, Aberdeen and Nashville Railroad, to be used in purchasing machine shops, depot grounds, and right of way.

The Chapman Valve Company, at Northampton, Mass., will have their new iron foundry built within two months. It will be 150x60 feet, with an L 100x30, and sand sheds, 100x15.

Benjamin F. Kelley, General Eastern Agent for the Baragwanath Steam Jacket Feed-Water Heater and Purifier, has moved his office from 20 Cortlandt street to 91 Liberty street, New York City.

W. P. Davis, North Bloomfield, N. Y., writes us that the demand for his key-seating machines is growing. Some of the best machinery dealers are handling them with satisfaction to all parties.

Business is good with machine tool builders in Worcester, Mass. Some of the establishments that were not long ago running short time have changed to full time, while some are running over-time.

The Winchester Repeating Arms Company, New Haven, Conn., have erected and put into operation a large rolling mill in which to manufacture and supply their establishment with cartridge metal.

The *Racine* (Wis.) *Manufacturer* says E. W. Rider, of that city, is fitting up a large new shop to meet the increasing demand for his pillow-sham holders and lifters. He will also manufacture other novelties.

W. Heuermann, agent for Schaffer & Budenberg, 40 John street, New York, has just received invoices for 500 various sizes of their new exhaust injectors, about 250 of which are now in use in the United States.

The Pittsburgh, Cincinnati and St. Louis Railroad Company, will erect shops at Columbus, O., this summer to cost $537,000. Fifty engines, thirty-six passenger and 3,000 freight cars will be the product annually.

The St. Louis *Age of Steel* says the new works of the Missouri Malleable Iron Company, of that city, have started up and made their first run with entire success. The present force of 75 men will soon be increased.

Joseph N. Booth, Birmingham, Conn., who has heretofore run a blacksmith shop and done small machine work, now proposes to add to his plant an engine, boiler, a trip-hammer, a blower, and other machinery.

The Victor Sewing Machine Company, Middletown, Conn., have decided to close up their business and sell their machinery. They have been manufacturing sewing machines, calipers and drill chucks.

McMahon & Carver, Worcester, Mass., are turning out lathes, planers, friction clutches and emery grinding machines, running full time and force. They have lately got out a new emery grinder for general shop purposes.

The Guild & Garrison Steam Pump Works, Brooklyn, N. Y., have issued a new 48-page illustrated catalogue. Each style of pump and air compressor is described intelligibly. It is well printed, and is bound so as to stand usage.

The Blakeney Foundry Company, Springfield, O., are erecting a foundry, 60x110 feet, and a machine shop, 48x102 feet. They will make the Blakeney Cupola Furnace. It is expected work will begin about June 1st, with a hundred men.

Broad & Ewer, manufacturers of steam and gas fittings and engineers' supplies, moved May 1st to their new factory, 251 to 255 Greenpoint avenue, Brooklyn, N. Y., where they have increased facilities and better store accommodations.

The De Forest Foundry, of Shelton, Conn., have just purchased lathes, planers, drills, and other tools to meet their increasing orders for machine work. They are furnishing castings to the Bridgeport Machine Tool Works; also to the Hendey Machine Company, of Torrington.

On May 1st the new offices and warerooms of Henry R. Worthington, 86 and 88 Liberty street, New York, were occupied. They have increased facilities in the location for meeting the demand for smaller classes of pumps, as well as improved accommodations for the water-works business.

The Love Manufacturing Company, of Pittsburgh, has erected extensive works at Rochester, Beaver County, Penn., in which sewing machines of the Love pattern will be manufactured. The capital stock of the company is $500,000, and there are orders enough on hand to pay 50 per cent. the first year.

J. A. Gilkerson's new machine shop at Homer, N. Y., has been started up. The main building is 30x84 feet; engine-house, 16x24 feet; and blacksmith shop, 12x12 feet. The productions will be light special machinery, steam pumps, hand and power drills, Gilkerson's Automatic Screw Slotting Machines, and special tools.

The Milburn Gin and Machine Company, Memphis, Tenn, have purchased all the property of the Carver Gin and Machine Company, and of the Milburn Iron Works, of Memphis; have increased their capital to $250,000, all paid in, and are now fully equipped for the manufacture of the most improved cotten gins and cotton-seed oil mill machinery.

The Southwark Foundry and Machine Company, of Philadelphia, have recently added to their machine shops a large extension, and have filled it with the best machine tools. The manufacture of the Porter-Allen engine is being vigorously prosecuted, and the company have adopted the specialties of hydraulic machines, including steam pumps, passenger elevators, water-works pumping engines, etc. The Southwark Company are now building a number of large Porter-Allen engines for leading rolling mills of the country. At Johnstown, Pa, Cleveland, O., Bethlehem, Pa., Albany, N. Y., Pittsburgh, Pa., Indianapolis, Ind, Springfield, Ill., Scranton, Pa., and other places, these engines have made a good record. The great obstacle to the universal introduction of these engines hitherto has been greater cost of the smaller sizes than other engines of equal power of first-class makers. To overcome this the cost of construction is being largely modified by new economic methods, and the rigid system rendered practicable by the increase in number of engines built. Where a single engine of a certain size was built alone, it was impossible to attain the same or approximate economy, as where a number were ordered of exactly the same dimensions in all their parts. This point has now been reached, and Porter-Allen engines can now be sold for about the same as other first-class engines. The company have in process of construction several rolling-mill engines of large sizes—one 44″x48″, one 14″x66″, two 44″x60″, one 22″x36″—beside a great number of smaller sizes for a great variety of other duties; three blowing engines for blast furnaces, several hydraulic passenger and freight elevators, pumps of various sizes, with much other heavy work of varied character, which the Southwark Foundry is peculiarly fitted to handle from its excellent equipment. The company has also the exclusive right of manufacture for the United States of the automatic ice machine—a simple and efficient apparatus for making ice and refrigerating apartments for every purpose, at a low cost.

The stockholders of the Yale Lock Manufacturing Company, of Stamford, Conn., have voted to accept the authority given them by an act of the Legislature of Connecticut, to change the title of the corporation to the Yale & Towne Manufacturing Company, by which latter name it will hereafter be known. They have issued a circular embodying the following particulars: This change has become desirable by reason of the greatly enlarged scope of the company's business, in which the manufacture of locks is now only one of several large departments, the tendency of the old name being to mislead customers as to the scope of the business and the facilities for its transaction. During the past seven years the company has gradually built up a large business in hoisting machinery, including cranes of all kinds and of the largest sizes, and during the past year has also undertaken the manufacture of the "Emery" Testing Machine. The production of work of this class involves the use of large and heavy machinery, and constitutes a branch of work entirely distinct from that included in the company's lock and hardware department. Another department is being organized for the manufacture, under the patents of A. H. Emery, of scales of all kinds, and of pressure gauges, the development of which will in time, it is believed, make this department of at least equal importance with the older ones. For the better handling of these departments a subordinate organization has been effected, under the general laws of the State, bearing the old title of the Yale Lock Manufacturing Company, and also a similar organization entitled the Weston Crane Company. In like manner, the Emery Scale Co. was organized during last year. The stock of all of these subordinate companies is owned and controlled by the parent company, now known as the Yale & Towne Manufacturing Company; and, although the several subordinate organizations will be permanently maintained, for purposes relating to the ownership of patents and other franchises, the business of all will be conducted by the Yale & Towne Manufacturing Company, Stamford Conn., in its own name and for its own account, so that all communications should hereafter be addressed to the latter name.

Machinists' and Engineers' Supplies.

NEW YORK, April 26, 1883.

With the more settled weather has come a better demand for supplies, although for small quantities; and considerable faith is manifested for a prosperous year's business. Prices remain unchanged.

Iron and Metal Review.

The sudden fall in Pig Iron during the week has had the effect of temporarily frightening buyers, and consequently an unsettled feeling prevails. It is intimated that production is to be curtailed by the blowing out of several furnaces. We quote prices as follows: Foundry, No. 1, at $21.50 to $22.50; Foundry, No. 2 X, $20; Grey Forge, $18.50 to $19.50. Foreign Iron continues, both in demand and prices, as last reported. There is little possibility of prices going any lower, as at present prices there is small margin for profit. Merchant Bar is in active demand for small quantities. Copper continues dull, at 15⅞c. to 16c. for Lake Superior, and other brands at 14¾c. to 15½c. Banca Tin, 22c. Straits and Malacca, 21¾c. to 21½c. Billiton and Australian, 21½c. to 21⅝c. English Lamb Refined, 21¾c. to 21⅞. Spelter Common Domestic, 4.75c. to 5c. Silesian, 5¼c. to 5½c. Refined, 8c. to 8¾c. Antimony, 9¾c. to 9⅞c. for Hallett's brand, and 10¾c. to 10⅞c. for Cookson's.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Wanted—Situation by a first-class planer-hand. Address, Planer, AM. MACHINIST.

A graduate of a polytechnical school, with experience, wishes a situation as draughtsman. Is a practical machinist. Address, D., AM. MACHINIST.

Job Wanted—On special machine pattern work near New York. Address, Pattern-maker, Box 379, South Norwalk, Conn.

Wanted—Situation as superintendent or engineer by a man of many years' experience, now filling similar situation. Address, Superintendent, care AM. MACHINIST.

Wanted—Ten machinists familiar with work on mowers and reapers; good wages and steady work for the right sort of men. Address "Mower and Reaper," care of AM. MACHINIST.

A mechanical engineer, with long experience in all branches of engineering and the management of specialties, is desirous of an engagement as superintendent. Address, Madison, AM. MACHINIST.

Wanted—Foremanship of factory or machine shop. Eight years' experience in first-class shops as foreman and supt.; very best of reference. Address, Successful, AM. MACHINIST, 96 Fulton street.

Wanted—For a large, well-equipped machine works, a thoroughly competent man to fill the position of master mechanic or general foreman. Address, B., AM. MACHINIST, giving full name and address.

Situation wanted as foreman by middle-aged man who has had charge of works employing 200 or more men building engines of all kinds and general machinery; has been with one firm as such for 12 years; can give good reference. Address E. W. care of AM. MACHINIST.

Wanted—Parties traveling and representing some house selling to users of steam boilers, to take the agency, on commission, of a fast-selling article—something that every user of a steam boiler wants. Must furnish good references and kind of trade solicited. Address, Manufacturer, care of this office.

Mechanical Engineer—Open for engagement June 1st. Experience covers designing, superintending details of construction and erecting of large engines and heavy machinery, foundations for same, etc.; shafting, gearing, heavy framing, and millwrighting generally; also buildings. Address, P. M., AM. MACHINIST.

Wanted—A permanent position as general manager, superintendent or designer and draughtsman by a live, scientific and practical man of long experience in designing and draughting all kinds of new machinery, including engines and boilers, and in the general organization, system and discipline of the work shop and the management of the help; can furnish the best of references. Address A. B. C., corner East Ninth and Oneida streets, old No. 87, Oswego, N. Y.

Wanted—A mechanical manager for a manufactory in Chicago, employing between 300 and 400 hands, and comprising a machine shop, a blacksmith shop, an iron foundry, a pattern shop, a millwright shop and a cabinet shop. Any applicant must be strong, reliable, and not above forty years of age. He must be thoroughly accustomed to steam-engine work, and to all of the details of economical shop management, and he must be a wide-awake man. One with some knowledge of business preferred. This is the best sort of an opportunity for the right man. Address, giving particulars, C. C., AM. MACHINIST.

Wanted—A Hydraulic Press of from 50 to 100 tons' pressure; one that works quick for pressing small articles. Address Dexter Curtis, Madison, Wis.

Light and fine interchangeable machinery to order. Foot and power lathes; slide rests, &c. Catalogue for stamp. Edwd O. Chase, Newark, N. J.

For Sale—Machine shop in a thriving town in Iowa with excellent trade and can be increased; good opening; cash required, about $5,000. Address Machine Shop, AM. MACHINIST.

Bradley's Heating Forges,

FOR COAL OR COKE,

BRADLEY & CO., - Syracuse, N. Y.

COOKE & CO., DEALERS IN

Machinery and Supplies,

12 CORTLANDT ST., NEW YORK.

AGENTS FOR

The Waters Perfect Governor.

Having Adjustable Speed, Automatic Safety Stop, Sawyer's Lever, and Solid Composition Valves and Seats. Also

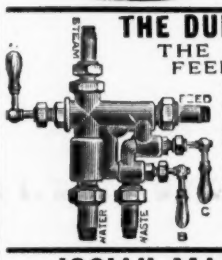
SUPPLIES

For Machinists, Railways, Mills, Mines, &c.

Please send for circular and state that you saw the advertisement in this paper.

THE DUPLEX INJECTOR,

THE BEST BOILER FEEDER KNOWN.



Not liable to get out of order. Will lift water 25 feet. Always delivers water *hot* to the boiler. Will start when it is hot. Will feed water through a heater. Manufactured and for sale by

JAMES JENKS, Detroit, Mich.

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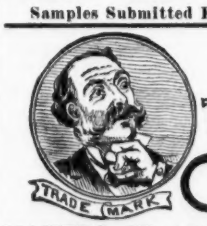
189 & 191 Front Street, New York,

MANUFACTURERS OF

Machinery, Engine, Cylinder, and Tempering

OILS

Samples Submitted Free. Established 1822.



THOMPSON & HOLMES CHUCKS

MAKERS OF ALL KINDS & SIZES.

Send for Catalogue to

JAMES D. FOOT, Sole Agent,

No. 101 CHAMBERS STREET, NEW YORK.

REMOVAL.

ON OR ABOUT MAY 1, 1883, THE OFFICE OF THE

Knowles' Steam Pump Works

WILL BE REMOVED TO THEIR NEW QUARTERS,

NO. 93 LIBERTY ST., NEW YORK.

UNION STONE COMPANY,

Patentees and Manufacturers

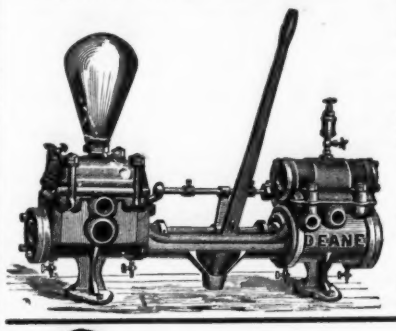
OF THE

UNION EMERY WHEEL.

EMERY, EMERY WHEEL MACHINERY AND TOOLS A SPECIALTY.

Automatic Knife Grinding Machines, Wood Polishing Wheels, Grinders' and Polishers' Supplies. Catalogues on application.

38 AND 40 HAWLEY STREET, BOSTON, MASS.



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Steam Pumps for Every Service.

Send for New Illustrated Catalogue.

THE DEANE STEAM PUMP CO.,

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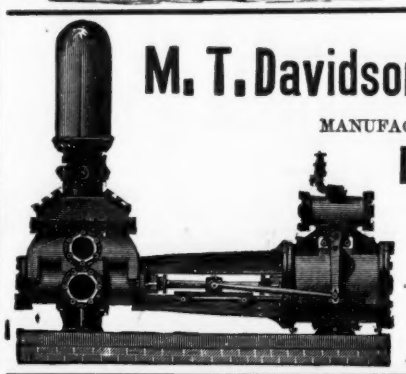
92 & 94 Liberty St., NEW YORK. 54 Oliver St., BOSTON. 226 & 228 Lake St., CHICAGO.



THE

M. T. Davidson Improved Steam Pump,

MANUFACTURED BY

Davidson Steam Pump Co.,

OFFICE & WORKS:

41 to 47 KEAP STREET, BROOKLYN, N. Y.

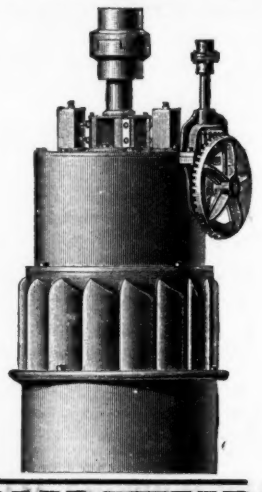
Warranted the Best Pump made for all Situations.

KELLY & LUDWIG, Agents,

49 & 51 North 7th St., Philadelphia.

THE HERCULES TURBINE

Gives more power for the same size, also better average results from full to one-half gate than any other water wheel ever made. It is moderate in cost, compact in form, and not liable to get out of order.



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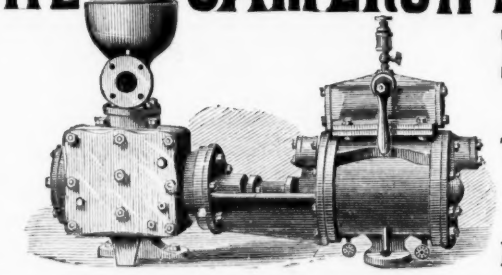
THE HOLYOKE MACHINE CO.

SHOPS AT

Holyoke and Worcester, Mass.

Send for Catalogue, Circulars and Price List to either of the above places.

THE CAMERON STEAM PUMP.



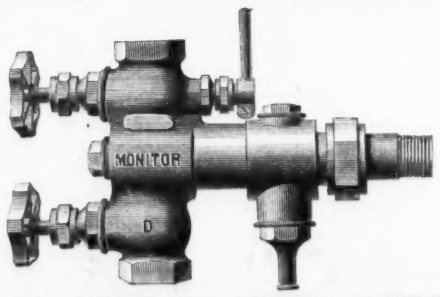
Is the Standard of Excellence

AT HOME AND ABROAD.

THE A. S. CAMERON Steam Pump Works,

Foot of East 23d St., NEW YORK.

THE "MONITOR."



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BEST BOILER FEEDERS IN THE WORLD.

FRIEDMANN'S

Patent Ejectors,

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WATER ELEVATORS,

For Conveying Water and Liquids.

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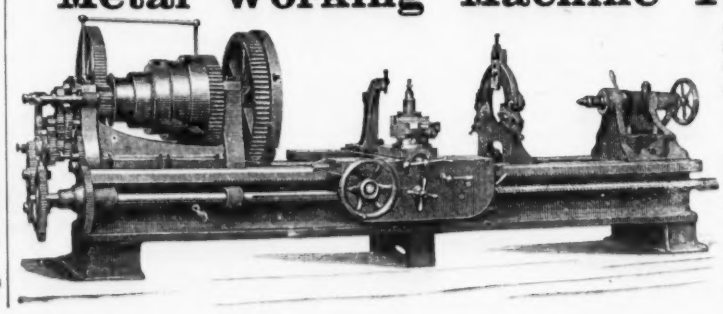
Metal Working Machine TOOLS



of all descriptions, and a great number of sizes; including also,

STEAM HAMMERS,

Steam and Hydraulic Riveters, Cranes, Punches & Shears, Bending Rolls, Plate Planers, etc.

NICHOLSON FILE CO.,

SOLE MANUFACTURERS OF

FILES AND RASPS

HAVING THE INCREMENT CUT.

Also, FILERS' TOOLS AND SPECIALTIES.

"Nicholson File Co's" Files and Rasps, "Double Ender" Saw Files, "Slim" Saw Files, "Bacer" Horse Rasps, Handled Rifflers, Machinists' Scrapers, File Brushes, File Cards, Surface File Holders, Vise File Holders, Stub Files and Holders, Improved Butchers' Steels

Manufactory and Offices at PROVIDENCE, R. I.- U. S. A.

TESTIMONIALS ON THE MERITS OF THE

PATENT NICKEL-SEATED "POP" SAFETY VALVE.

PITTSBURGH, April 10th, 1882.

C. A. MOORE, ESQ., PREST. CONSOLIDATED SAFETY VALVE. CO.
111 Liberty Street, NEW YORK.

DEAR SIR:—In reply to your favor of the 7th inst., we would state that in October, 1874, we placed upon our boilers your 3-inch Nickel Seated Pop Safety Valves, which have always done their work satisfactorily, relieving the boilers instantaneously when the steam pressure reached the blowing off point, viz., 80 lbs. We have also furnished your valves to a number of our customers who have been well pleased therewith. The best evidence of which is the fact that after once using your valve they adopted them for their subsequent requirements. Yours truly,
ATWOOD & McCAFFREY.

YOUNGSTOWN, O., April 14th, 1882.

C. A. MOORE, ESQ., PREST. CONSOLIDATED SAFETY VALVE CO.,
111 Liberty Street, NEW YORK.

DEAR SIR:—Replying to your letter of the 7th inst. It is now about twelve years since we commenced to use and recommend to others, "Nickel Seated Pop Safety Valve." From practical experience we have no hesitation in saying that it is the only Safety Valve in use, which can, under all circumstances, be relied upon. Yours truly, WILLIAM TOD & CO.

BETTS MACHINECO. WILMINGTON, DEL.

Have on hand for immediate delivery, New Tools, as follows:

36 inch Lathes, to turn 16¾ or 14½ feet, triple-geared and screw-cutting, especially heavy, powerful and stiff.

40 inch and 48 inch Radial Drills, with or without self-feed, back-gear, or square hinged table.

No. 4 Hydrostatic Wheel Press, for 72 inch wheels.

SECOND-HAND.

32 inch square Planer, to plane 9 feet. In first-class order, used only in our own shop.

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BUILDERS OF IMPROVED

WOOD-WORKING MACHINERY

Embraces nearly 400 Machines for

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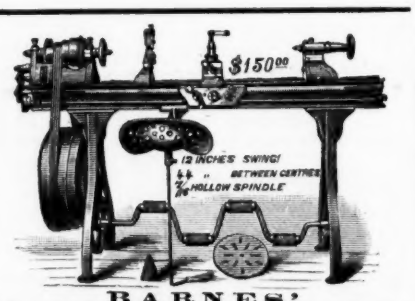
Variety and Universal

WOOD WORKERS.

Band, Scroll and Circular Saws, Resawing Machines, Spoke and Wheel Machinery, Shafting, Pulleys, etc. All of the highest standard of excellence.

W. H. DOANE, Pres't. D. L. LYON, Sec'y.



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Patent Foot and Steam Power Machinery. Complete outfits for Actual Work-shop Business. Lathes for Wood or Metal. Circular Saws, Formers, Mortisers, Tenoners, etc., etc. Machines on trial if desired. Descriptive Catalogue and Price List free.

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MACHINERY FOR REDUCING AND POINTING **WIRE**

by compression or swaging **COLD.** Machines manufactured under patents owned by Miller, Metcalf & Parkin, Pittsburgh, Pa. For machines or information, address

S. W. GOODYEAR,

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THE **American Drill Chuck**

Is the cheapest 3-parallel Jaw Chuck. Price, $4.

Sold by all Tool Dealers.

BREHMER BROS., 440 North 12th Street, Philadelphia, Pa.

AKRON IRON COMPANY,

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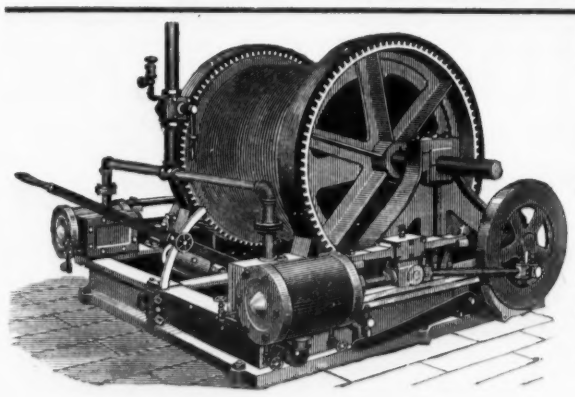

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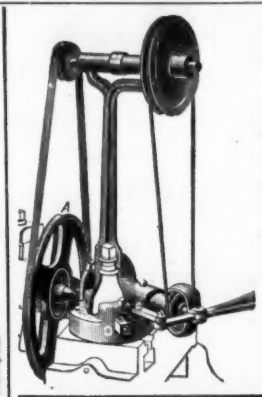

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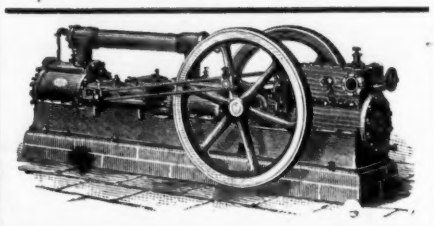

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" 11	1 3-4 "	1.25
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" 13	2 1-4 "	1.60
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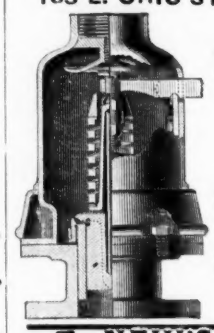

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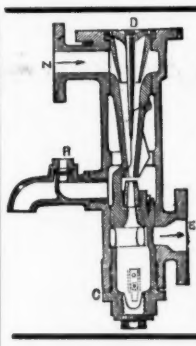

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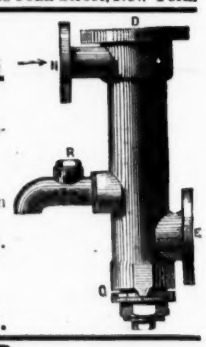

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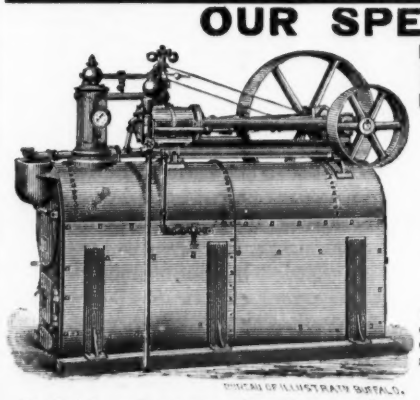

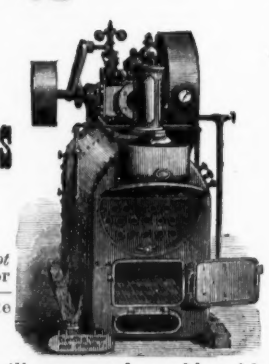

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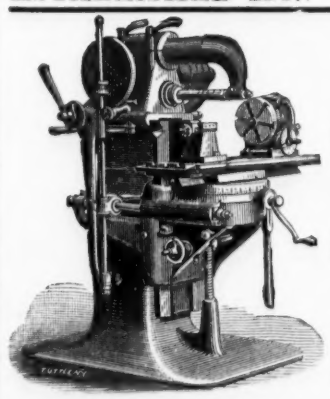

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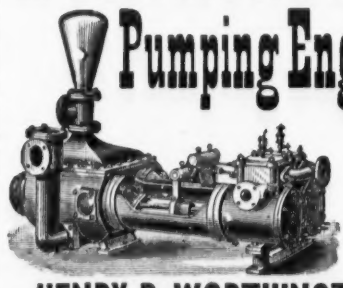

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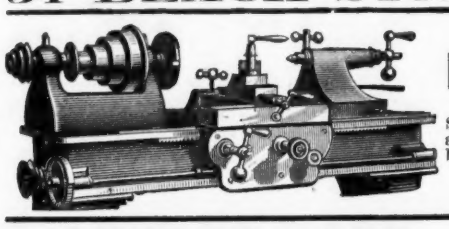

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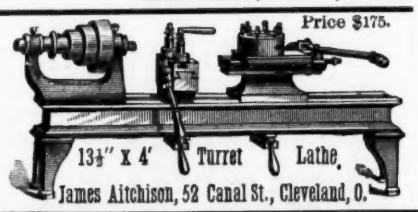

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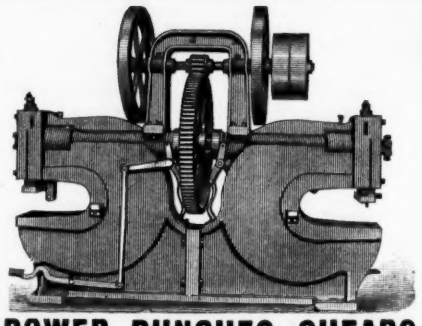

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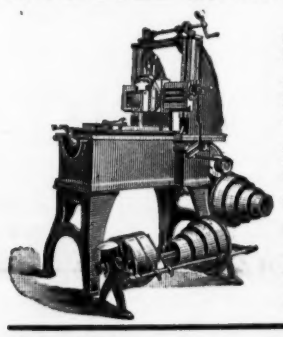

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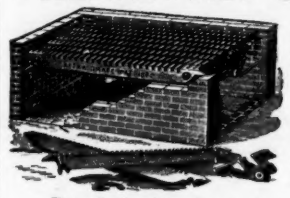

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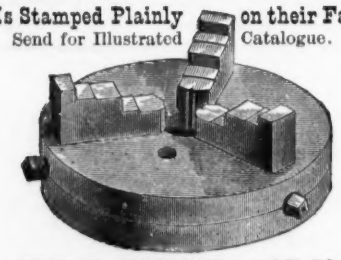

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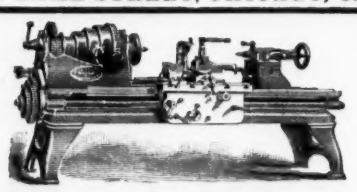

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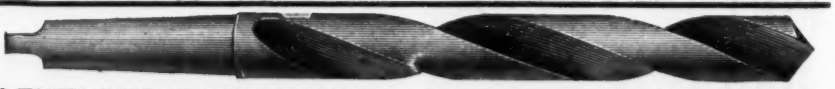

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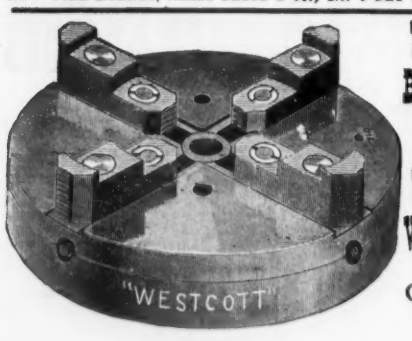

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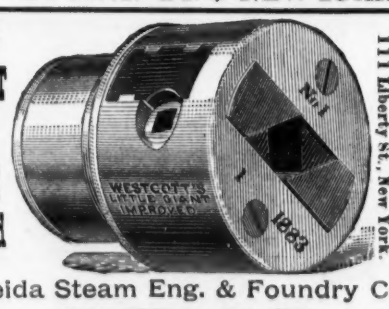

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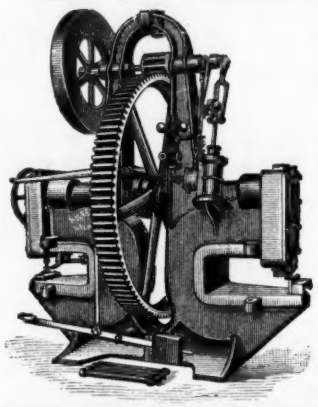

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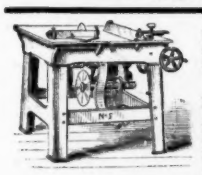

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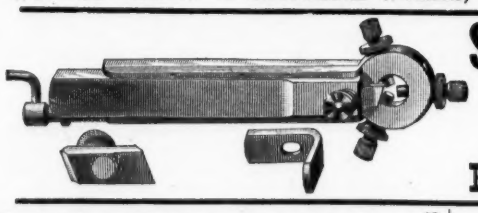

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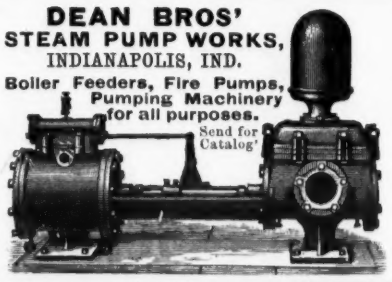

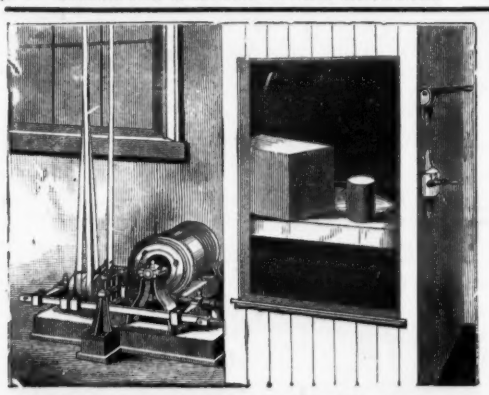

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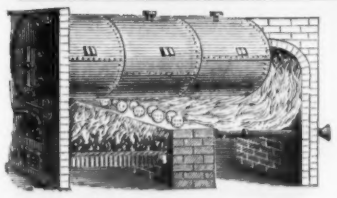

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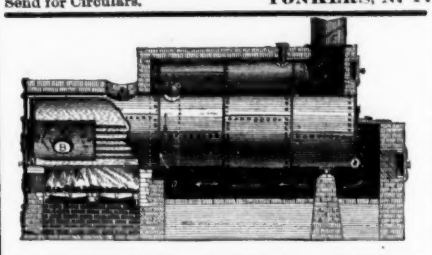

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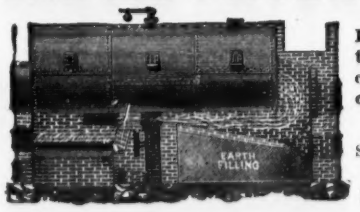

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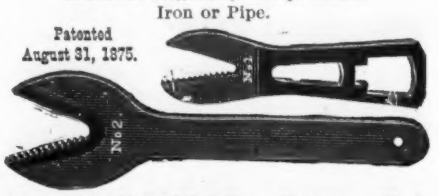

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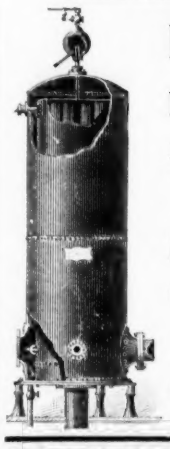

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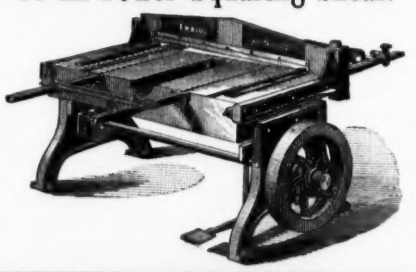

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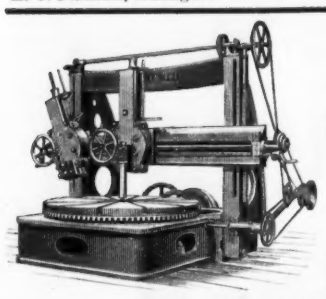

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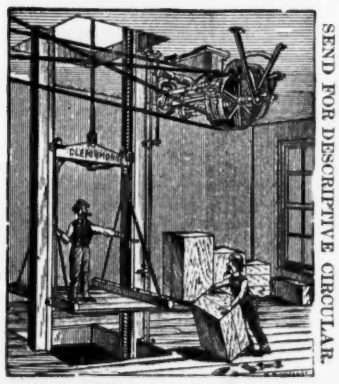

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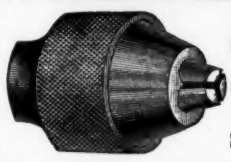

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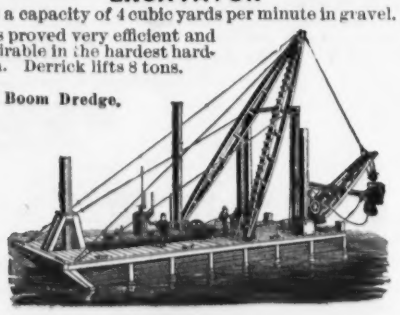

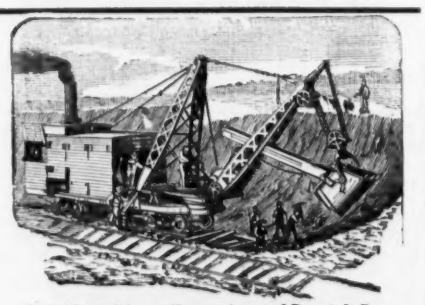

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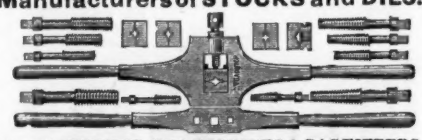

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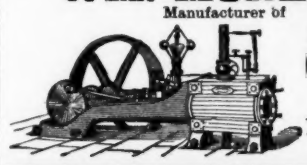

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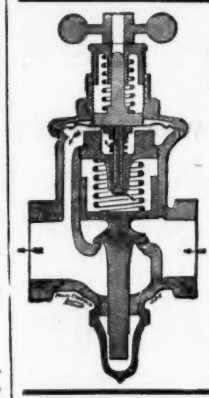

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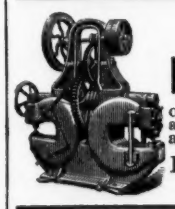

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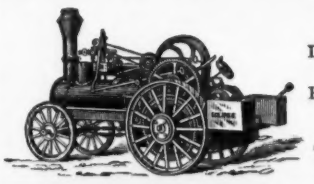

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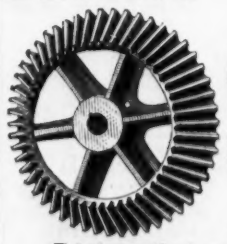

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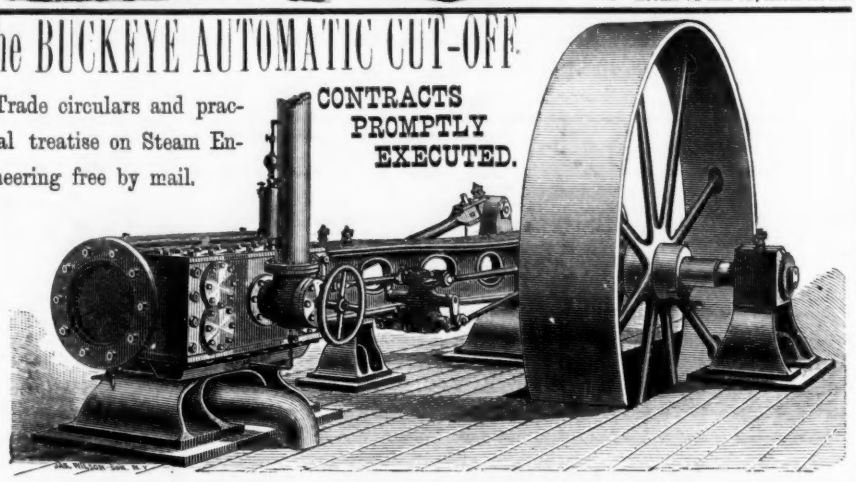

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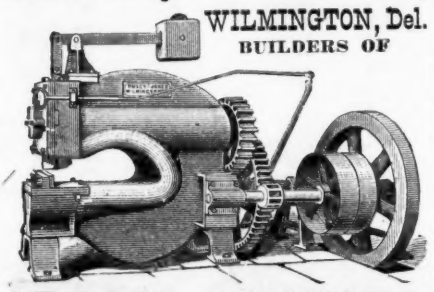

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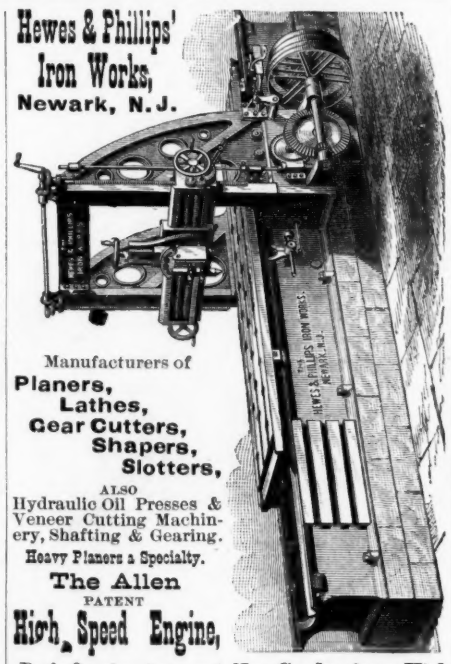

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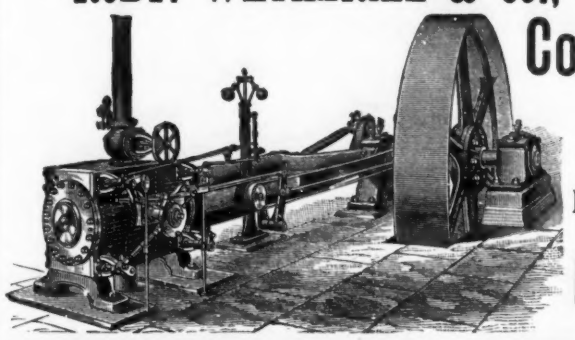

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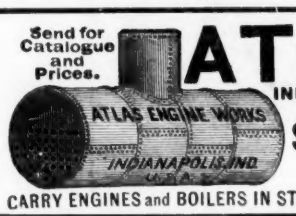

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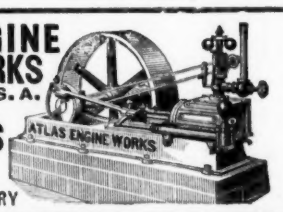

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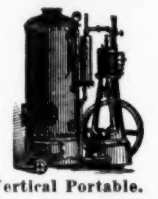

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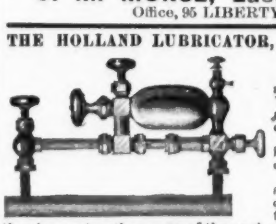

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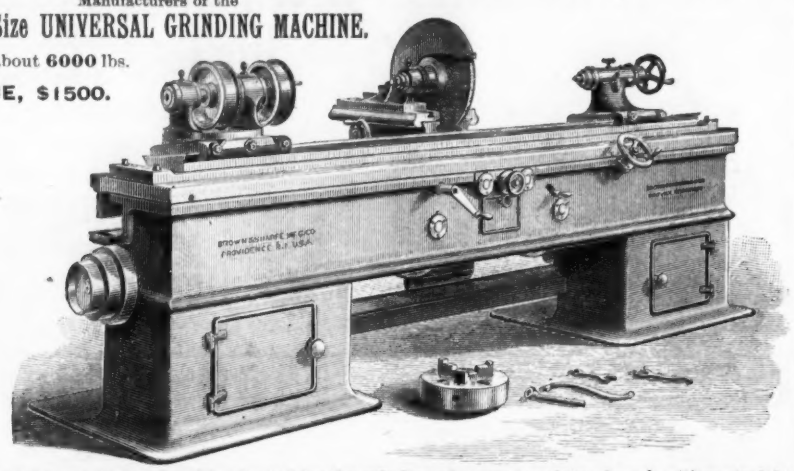

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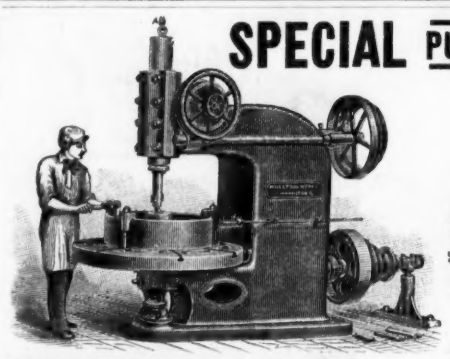

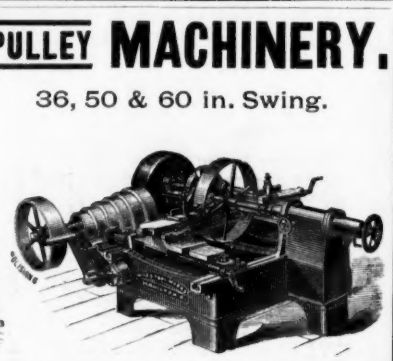

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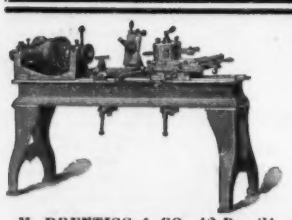

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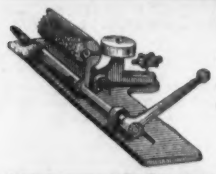

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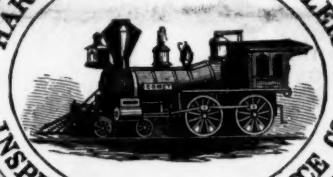

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